AGILENT TECHNOLOGIES, INC.
Legal Department, DL429
Intellectual Property Administration
P. O. Box 7599
Loveland, Colorado 80537-0599

Dmarpe

ATTORNEY DOCKET NO. 10980101-1

AF/# 2863

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Lee A. Barford

Serial No.: 10/053,748 **Examiner:** John H. Le

Filing Date: January 18, 2002 **Group Art Unit:** 2863

Title: REVISING A TEST SUITE USING DIAGNOSTIC EFFICACY EVALUATION

COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith in ***triplicate*** is the Appeal Brief in this application with respect to the Notice of Appeal filed on Dec. 12, 2003.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) **$330.00**.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

☐ (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)(1)-(5)) for the total number of months checked below:

☐	one month	$ 110.00
☐	two months	$ 420.00
☐	three months	$ 950.00
☐	four months	$1480.00

☐ The extension fee has already been filled in this application.

☒ (b) Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account **50-1078** the sum of **$330.00**. At any time during the pendency of this application, please charge any fees required or credit any overpayment to Deposit Account **50-1078** pursuant to 37 CFR 1.25.

A duplicate copy of this transmittal letter is enclosed.

☒ I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date of Deposit: February 12, 2004 **OR**

☐ I hereby certify that this paper is being facsimile transmitted to the Patent and Trademark Office on the date shown below.

Date of Facsimile:

Typed Name: J. Michael Johnson

Signature: J. M. Johnson

Respectfully submitted,
Lee A. Barford

By J. M. Johnson

J. Michael Johnson
Attorney/Agent for Applicant(s)

Reg. No. 37,856

Date: February 12, 2004

Telephone No. (775) 849-3085

AGILENT TECHNOLOGIES, INC.
Legal Department, M/S DL429
Intellectual Property Administration
P. O. Box 7599
Loveland, CO 80537-0599

PATENT APPLICATION
ATTORNEY DOCKET NO. **10980101-1**

APPEAL BRIEF dated **Feb. 12, 2004**

OFFICIAL

Appl. No.	:	10/053,748
Applicant	:	Lee A. Barford
Filed	:	Jan. 18, 2002
TC/A.U.	:	2800/2863
Examiner	:	John H. Le
Docket No.	:	10980101-1
Customer No.	:	022878
Title	:	REVISING A TEST SUITE USING DIAGNOSTIC EFFICACY EVALUATION

Confirmation No. 5462

Mail Stop Appeal Briefs - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANT'S BRIEF ON APPEAL

Sir:

This is an appeal under 37 CFR 1.191 from a Final Rejection in an Office Action mailed 10/20/03. A Notice of Appeal was filed on 12/12/03. Jurisdiction over this appeal resides in the Board of Patent Appeals and Interferences under 35 U.S.C. §134. An oral hearing was not requested.

A Certificate of Mailing or Transmission is provided on the last page of this document and applies to this document and any Appendix attached hereto.

REAL PARTY IN INTEREST

The real party in interest is Agilent Technologies, Inc., of Palo Alto, CA.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF THE CLAIMS

The claims for consideration on appeal in the present application are Claims 1-38. Claims 1 and 32 were amended in an "Amendment" filed by facsimile transmission on Aug. 29, 2003. The claims as amended are presented herewith in the attached Appendix to Appeal Brief.

STATUS OF THE AMENDMENTS

In a Final Office Action mailed 10/20/03, the Examiner indicated that the amendments made to the claims in Appellants' Amendment of 8/29/03 were accepted and entered.

SUMMARY OF THE INVENTION

According to various embodiments of the present invention, a revision of a test suite of a diagnostic testing system is determined by evaluating diagnostic efficacy and accuracy of the test suite (page 7, lines 5-7). In particular, some embodiments suggest tests to add to the test suite that may improve diagnostic efficacy and accuracy of the testing system (page 7, lines 7-9). Adding the suggested test or tests may improve the ability of the testing system to accurately diagnosis a failure detected in a device under test (DUT). Some embodiments alternatively or further establish a relative diagnostic value of tests in a test suite of the testing system. The diagnostic value of the tests identifies tests that may be deleted from the test suite with minimal impact on an overall diagnostic efficacy of the test suite. In particular, tests determined to have a low relative efficacy value may be eliminated without adversely affecting overall diagnostic efficacy to reduce a cost, a complexity, and/or a redundancy of the tests performed by the testing system according to some

embodiments of the present invention (page 7, lines 9-11). The various embodiments of the present invention are applicable to virtually any model-based diagnostic testing system, but are particularly well suited for use in conjunction with automated testing systems, especially those used to test electronic systems.

In some embodiments of the present invention, a method of suggesting a test to add to a test suite of a diagnostic testing system is provided (FIG. 1, 100, page 9, lines 24-28). In particular, the method suggests a potential test to add to the test suite and provides an indication of a relative increase in an overall diagnostic efficacy of the test suite associated with adding such a test to the test suite (page 7, lines 7-9). The relative increase in overall diagnostic efficacy is provided as a 'score' for each suggested test (page 12, lines 12-16). In some embodiments, a list of suggested tests is generated that includes an assigned score for each suggested test in the list, thereby enabling a choice of which test or tests to add based on the score and other factors, such as constraints imposed by the DUT and/or available test equipment (page 12, lines 24-28).

The method of suggesting a test to add comprises creating a simulation database for the DUT and the test suite (FIG. 1, 110; page 9, lines 28-31; page 10, lines 6-18). The method of suggesting a test to add further comprises determining from the simulation database a probability of correct and incorrect diagnoses for the test suite (FIG. 1, 120; page 10, lines 19-22). The probabilities of correct and incorrect diagnoses are preferably determined for as many combinations of correct and incorrect diagnoses as are possible for the DUT (page 11, lines 1-9). The method of suggesting a test to add further comprises suggesting a test to add from the determined probabilities (FIG. 1, 130; page 11, lines 10-11). Suggesting comprises creating a list of suggested tests to be added to the test suite. In some embodiments, each suggested test on the list is provided in terms of what component(s) of the DUT it covers (page 11, lines 12-14, and lines 19-24).

In other embodiments of the present invention, a method of identifying a test to delete from a test suite is provided (FIG. 2, 200; page 17, lines 11-13). The method determines diagnostic efficacies of tests of the test suite (page 17, lines 13-14). In particular, the method of identifying generates a list of tests, each test on the list being associated with a relative diagnostic efficacy or diagnostic value of the test. The list

may be used to identify the test that may be safely eliminated as having low diagnostic efficacy (page 17, lines 15-18).

The method of identifying a test to delete comprises creating a simulation database for the DUT and the test suite (FIG. 2, 210; page 17, lines 21-22). The method further comprises determining a probability of a correct diagnosis using the test suite (FIG. 2, 220; page 18, lines 3-4 and lines 7-11). The method further comprises determining a probability of a correct diagnosis for a modified test suite (FIG. 2, 230; page 18, lines 12-13). The modified test suite is the test suite with a selected test deleted from the suite (page 18, line 13-16). Determining a probability of a correct diagnosis for the modified test suite is preferably repeated with a different one of the tests in the test suite being the selected test that is deleted (page 18, lines 16-19). The method further comprises computing an efficacy value for each of the tests in the test suite (FIG. 2, 240; page 18, lines 22-23). The method further comprises identifying a test to delete from the determined probabilities and computed efficacy values (page 19, lines 10-11). Identifying comprises generating a list of the tests and associated efficacy values (FIG. 2, 250; page 19, lines 1-2). Tests with low efficacy values may be deleted from the suite without significantly reducing the overall diagnostic efficacy of the test suite (page 19, line 11-13).

In yet other embodiments of the present invention, a system that determines a diagnostic efficacy of a test suite of a testing system is provided (FIG.3, 300, 300'; page 23, lines 21-22). The system determines an efficacy of tests in a test suite and either or both suggests tests to add and identifies tests to delete from the test suite (page 23, lines 23-29). The system comprises a processor, a memory and a computer program stored in the memory (FIG. 3, 310, 320, 330, 330'; page 23, line 30 to page 24, line 13). The processor accesses the computer program from memory and executes the computer program. The computer program comprises instructions that when executed implement determining the efficacy of tests in a test suite. The instructions may further implement suggesting tests to add and/or identifying a test to delete from the test suite (page 24, line 21 to page 25, line 2; page 25, lines 3-14). In some embodiments, the instructions implement any of the described embodiments of the method of the present invention (page 24, lines 13-20). The system of the present

invention may be a stand-alone system or may be incorporated into a testing system for testing a DUT (page 24, lines 3-4).

ISSUES

Issue 1: Whether the Examiner's final rejection of Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* anticipation.

Issue 2: Whether the Examiner's final rejection of Claims 8 and 32 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (USPN 5,922,079) in view of Kanevsky et al. (U.S. Pat. No. 6,167,352) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* obviousness.

Issue 3: Whether the Examiner's final rejection of Claim 38 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (USPN 5,922,079) in view of Preist et al. (U.S. Pat. No. 5,808,919) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* obviousness.

Issue 4: Whether the Examiner's final rejection of Claims 31 and 37 should be reversed on the grounds that the Examiner has not provided a specific rejection or reason therefor under any statute or rule.

Issue 5: Whether the objection raised by the Examiner to Claims 9 and 12-30 as being dependent upon a rejected based claim should be withdrawn in light of the allowability of the respective base claims as established herein below.

GROUPING OF CLAIMS

For each ground of rejection which Appellants contests hereinbelow for which the rejection ground applies to more than one claim, the additional claims do not stand or fall together to the extent the claims are separately identified and argued below. Specifically, Appellants submit that Claims 1-7, 10-11 and 32-36 do not stand or fall together as to the rejection under 35 U.S.C. §102(b) and that Claims 8, 32 and 38 do not stand or fall together as to the rejections under 35 U.S.C. §103(a). Separately patentable as to the respective rejections under 35 U.S.C. §102 and 35 U.S.C. §103

are explained in more detail herein below for particular claims and/or groups of claims.

ARGUMENT

Prior to beginning a discussion of and remarks regarding the above-presented issues, a brief overview of the content and scope of one of the references, Booth et al. (US Pat. No. 5,922,079), cited by the Examiner is provided. Following the overview of Booth et al., a brief review of a meaning of probability in the context of the instant application is presented.

Booth et al. disclose an automated analysis and trouble shooting system that identifies potential problems with a test suite of a model-based diagnostic system and also identifies probable modeling errors based on incorrect diagnoses (col. 5, lines 36-40). According to Booth et al., the disclosed automated analysis includes a detectability analysis having a first stage that flags components and subcomponents with no coverage in the test suite (col. 7, lines 31-33) and a second stage that either assigns a numerical value to components having inadequate coverage or simply flags such components (col. 7, lines 42-45). Detectability, according to Booth et al., is essentially an examination of test coverages of individual tests in a test suite with a focus on finding components of the unit under test having poor coverage.

The automated analysis and troubleshooting system of Booth et al. further includes diagnosability. Booth et al. define diagnosability as the ability to uniquely identify faulty components within a larger set of candidates (col. 7, lines 65-67). Specifically, Booth et al. disclose diagnosability "as the ability to uniquely identify faulty components with a larger set of candidates" or simply to "discriminate between components" (col. 7, lines 65-67; col. 8, lines 9-12). As such, diagnosability is a further examination of test coverages in an attempt to find components with overlapping coverages that yield an inability to distinguish failures in the components.

Additionally, according to Booth et al., the automated analysis also provides a means for debugging the model "based on incorrect diagnoses" (col. 9, lines 33-37). The 'model' includes information on "tests, operations, components tested by operations, and utilization of the tested components by the associated operations" (col. 6, lines 38-41). Moreover, Booth et al. explicitly state that "with diagnosis as a

guide, the UUT (unit under test) is repaired" and that "[d]uring repair, the TFC (true failure cause) may be determined" (col. 6, lines 41-43). Booth et al. explain that debugging involves modifying operation violation penalties used in setting diagnoses weights. Modifying is used to move a given diagnosis up or down in a list of possible diagnoses (col. 10, line 66 to col. 11, line 23). The operation violations may employ data including a failure probability for one or more components in the UUT. The goal of moving candidate diagnoses up or down in the list is to insure that a highest weighted candidate diagnosis is the true failure cause (TFC) (col. 9, lines 41-45).

In the instant application as well as in the discussion hereinbelow, Appellant employs the term 'probability' in the conventional sense. Namely, 'probability', $P(a)$, is defined as the limit of a relative frequency n_a/n of an occurrence of event a, wherein n_a is a number of times event a is observed to occur during n trials or experiments. Put another way, $P(a)$ is the likelihood of event a occurring in a number of experiments. A probability of an event is distinct from the event itself. For example, during an experiment involving the flipping of a coin, the probability of the event 'heads' is one half. The probability of 'heads' is a number that describes the likelihood that the event 'heads' will occur during any given instance of flipping the coin. Similarly, the probability of the event 'heads' is distinct from the probability of the event 'tails' even though the two probabilities happen have equal values for the coin flipping example.

Thus in accordance with the instant patent application, a probability of one or both of a correct diagnosis and an incorrect diagnosis may be determined from a simulation database by "dividing the number-of-occurrences of the particular diagnosis by a total number-of-occurrences of all diagnoses included in the determination" (Appellant's specification page 11, lines 6-7). In some embodiments, the simulation database represents the results of applying the test suite to test a number of devices under test (DUTs) or simulated DUTs, wherein DUTs in each instance of applying have different failure causes. The event of a correct diagnosis is distinct from the probability of a correct diagnosis. More to the point, the probability of a correct diagnosis is developed or determined, in most case, using the test suite to test a large number of DUTs or simulated DUTs representing a large number of failure conditions (e.g., different failed and non-failed components) and observing or

counting a number of correct diagnoses relative to a total number of diagnoses. Similarly, the probability of an incorrect diagnosis is distinct from the event of an incorrect diagnosis.

With the background provided above, each of the Issues listed hereinabove are addressed below.

Issue 1: Whether the Examiner's final rejection of Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* anticipation.

Appellant submits that the Examiner, in rejecting Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079), has erred for failing to establish a case for *prima facie* anticipation. Specifically, the Examiner has failed to show that there is "no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention." *Scripts Clinic & Research Found. V. Genentech Inc.*, 927 F.2d 1565, 18 USPQ 2d 1001, 1010 (Fed. Cir. 1991). Moreover, the Examiner has not demonstrated for any of Claims 1-7, 10-11 and 32-36, which are rejected under 35 U.S.C. §102(b), that there is a disclosure in a single prior art reference of "each element of the claim under consideration". *W.L. Gore & Associates v. Garlock*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983). That notwithstanding, the Examiner furthermore has failed to show that each element disclosed by the reference is "arranged as in the claim" as required by the court in *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ (Fed. Cir. 1984) at 481, 485. As such, the rejection of Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079) is unsupported by the case law. As stated by the Federal Circuit "if the examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of patent". *In re Oelrich*, 977, F.2d 1443, 24 USPQ 2d 1443 (Fed. Cir. 1992).

With respect to Claims 1-7 and 10, directed to a method of determining a revision of a test suite of a model-based diagnostic testing system, the Examiner has provided no supportable finding that Booth et al. disclose "evaluating a diagnostic

efficacy of the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite" as recited in Claim 1. In particular, Booth et al. do not disclose or suggest a probability of a correct diagnosis or a probability of an incorrect diagnosis or the use of the same in evaluating a diagnostic efficacy of the test suite.

In finally rejecting Claim 1, the Examiner contended that Booth et al. teach an automated analysis and troubleshooting system and stated that the system, "identifies potential problems with the test suite, and also identifies probable modeling errors based on incorrect diagnoses (e.g., Col. 5, lines 35-40), the method comprising step of evaluating a diagnostic efficacy of the test suite (e.g., Col. 9, lines 14-15) using a probability of one or both of a correct diagnosis and incorrect diagnosis by the test suite (e.g., Col. 11, lines 15-18, lines 27-29)".

However, contrary to that contended by the Examiner, Booth et al. disclose neither "a probability of one or both of a correct diagnosis and incorrect diagnosis by the test suite" nor "evaluating a diagnostic efficacy of the test suite" using the probability. At Col. 9, lines 14-15, Booth et al. instead disclose that "the test suite may be evaluated for overall accuracy by analysis of historical data (FIG. 1, 126)". At Col. 11, lines 15-18, Booth et al. further disclose "[t]he diagnostic system maintains lists of violated operations, of passing and failing test, and of candidate diagnoses and their associated weights and penalties". Moreover, at Col. 11, lines 27-29, Booth et al. disclose "[a]s a result, altering prior failure probabilities to correct a single diagnosis is rarely appropriate (and not depicted in FIG. 3)".

According to Booth et al., the term 'historical data' means 'historical TFC (i.e., true failure cause) data'. Historical TFC data is related to a "diagnosability index" that "may be computed from the frequency with which two candidate diagnoses are assigned identical weights by the model-based diagnostic system over a set of representative failures" (e.g., see Abstract and Col. 9, line 5 of Booth et al.). Further, Booth et al. define 'operation' as "a process or action carried out by one or more functional tests" (Col. 2, lines 11-12). A 'violated operation' is defined as an operation that "fails in one test, causing the entire test to fail, yet passes in another test" (Col. 8, lines 21-23). According to Booth et al., 'passing and failing tests' are just that, tests that either pass or fail during an application of the test suite to a unit

under test (UUT) while 'candidate diagnoses' are defined as "a minimal set of components, which, if faulty, is capable of explaining all failing test results" (Col. 3, lines 42-44). 'Weights and penalties' are assigned to candidate diagnoses to rank or order the individual candidate diagnoses developed by the diagnostic system (e.g., see discussion beginning at Col. 3, line 56 through Col 5, line 8). The reference to "prior failure probabilities" by Booth et al. at Col. 11, lines 27-29, refers to a failure probability observed in historical information for a particular candidate diagnosis and involves "the probability of components involved in the candidate diagnosis failing given only that some tests have failed" (e.g., see discussion of equation (1) and equation (2), Col. 3, line 65 through Col. 4, line 64).

As such and in direct conflict with that contended by the Examiner, nowhere in Booth et al., either in the portions cited by the Examiner or anywhere else in USPN 5,922,079 for that matter, is there a disclosure of a 'probability of a correct diagnosis' or disclosure of a 'probability of an incorrect diagnosis' or a disclosure of using one or both such probabilities in 'evaluating a diagnostic efficacy of the test suite'. The terms 'lists', 'violation operations', 'passing and failing tests', 'candidate diagnoses', or 'weights and penalties associated with candidate diagnoses' are not probabilities. Furthermore, notwithstanding the admonition of Booth et al. that "altering prior failure probabilities to correct a single diagnosis is rarely appropriate", 'prior failure probabilities' are not probabilities of a correct diagnosis or an incorrect diagnosis.

Given the discussion hereinabove, Appellant respectfully submits that the Examiner erred in finally rejecting Claim 1 under 35 U.S.C. §102(b) because the legal requirements for a showing of *prima facie* anticipation under 35 U.S.C. §102(b) have not been met. In particular, Booth et al. fail to disclose or suggest each element of Claim 1 (*W.L. Gore & Associates v. Garlock*, cited *supra*) as arranged in the claim, (*Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, cited *supra*), such that there is a difference between that claimed in Claim 1 and Booth et al., as viewed by a person of ordinary skill in the field of the invention (*Scripts Clinic & Research Found. V. Genentech Inc.*, cited *supra*). Therefore, the Examiner has failed to establish a case of *prima facie* anticipation of Claim 1 by Booth et al.

Claim 2 ultimately depends from and includes all of the limitations of base Claim 1. Notwithstanding additional limitations introduced in Claim 2, a case for

prima facie anticipation has not been established for Claim 2 for at least the same reasons set forth above for Claim 1.

In finally rejecting Claim 3, the Examiner contended that "Booth et al. teach suggesting a test comprising: creating a simulation database 124 of the test suite; determining a probability of a correct diagnosis (e.g., Col. 6, lines 49-54) and a probability of an incorrect diagnosis for the test suite using the database (e.g., Col. 9, lines 33-61); and creating a list of suggested tests from the determined probabilities (e.g., Col. 10, lines 66-Col. 11, line 35)."

However, at Col. 6, lines 49-54, Booth et al. actually disclose "[a]lso in the invention, if a diagnosis 110 is not consistent with the TFC 114, then automated model debug 120 analyzes the model 108 for possible changes to the model that would result in a correct diagnosis 110. Test suite analysis 116 and model debug analysis 120 can be used with simulated data 124 or with historical data 126 when available".

Contrary to that contended by the Examiner, nowhere in the above-referenced passage of Booth et al. (cited by the Examiner) is "determining a probability of a correct diagnosis ..." taught or suggested. Similarly, at Col. 9, lines 33-61, Booth et al. fail to disclose "... and a probability of an incorrect diagnosis for the test suite using the database". For that matter and as discussed at length hereinabove with respect to Claim 1, Booth et al. do not even disclose a probability of either a correct diagnosis or an incorrect diagnosis. Thus, Booth et al. do not and cannot disclose "determining a probability of a correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database", as claimed in Appellant's Claim 3.

Further contrary to the Examiner's contention, at Col. 10, line 66 – Col 11, line 35, Booth et al. fail to disclose "creating a list of suggested tests from the determined probabilities", as claimed in Claim 3. In fact, since Booth et al. fail to disclose or suggest the determination of such probabilities, then Booth et al. fail to disclose creating a list of suggested test therefrom.

Since Booth et al. do not disclose or suggest all the elements claimed in Claim 3, then the Examiner has failed to establish a case of *prima facie* anticipation of Claim 3 by Booth et al. *W.L. Gore & Associates v. Garlock*, cited *supra*. Moreover, Booth et al. do not disclose the claimed elements of Claim 3 as arranged in the claim.

Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co., cited *supra*. In fact, Appellant submits that Booth et al. do not disclose any of the elements as claimed in Claim 3. Therefore, a person of ordinary skill in the field of the invention would find that there is a difference between that claimed in Claim 3 and that taught by Booth et al. *Scripts Clinic & Research Found. V. Genentech Inc.*, cited *supra*.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Appellant's Claim 3 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claim 3 on the grounds that such a rejection is unsupported by the reference.

Claim 4 depends from and includes all of the limitations of at least Claim 3. Notwithstanding additional limitations introduced in Claim 4, a case for *prima facie* anticipation has not been established for Claim 4 for at least the same reasons set forth above for Claim 3.

In finally rejecting Claims 5-7, and 10, the Examiner contended that "Booth et al. teach identifying a test to delete from the test suite (e.g., Col. 10, line 66-Col. 11, line 15), determining a probability of a correct diagnosis for a modified test suite using the database (e.g., Col. 11, lines 24-35, lines 67), the modified test suite (e.g., Col. 10, lines 66-67) having a selected test removed from the test suite (e.g., Col. 11, lines 4-10); computing an efficacy value associated with the selected test using the determined probabilities of a correct diagnosis for the test suite and the modified test suite (e.g., Col. 5, lines 49-59); and generating a list of deletable tests and associated efficacy values (e.g., Col. 9, lines 38-40, Col. 11, lines 15-19).

While rejected together by the Examiner, Claim 5 is directly dependent from Claim 3, while Claim 6 is directly dependent from Claim 1. Claim 7 is directly dependent from Claim 6 and Claim 10 is directly dependent from Claim 7.

Claim 5 is separately patentable over Booth et al. for several reasons, contrary to that contended by the Examiner. First, as discussed hereinabove for Claim 3, Booth et al. do not disclose "determining a probability of a correct diagnosis" in any context. As such, Booth et al. similarly do not disclose "determining a probability of a correct diagnosis for a modified test suite ...", as claimed in Claim 5. Second, since Booth et al. fail to disclose "determining a probability of a correct diagnosis for a modified test suite", Booth et al. cannot disclose "computing an efficacy value associated with the

selected test using the determined probabilities of a correct diagnosis for the test suite and the modified test suite". Third and following this analysis, since Booth et al. fail to disclose "computing an efficacy value ... using the determined probabilities ...", then Booth et al. cannot disclose "generating a list of deletable tests and associated efficacy values".

Claim 6 is separately patentable over Booth et al. contrary to that contended by the Examiner. First, Booth et al. do not disclose "evaluating a diagnostic efficacy of the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite", as discussed hereinabove for Claim 1. Second, Booth et al. similarly do not disclose "identifying a test to delete from the test suite, the deletable test having a minimal effect on an overall diagnostic efficacy of the test suite", as claimed in Claim 6.

Claim 7 is separately patentable over Booth et al. for several reasons, contrary to that contended by the Examiner. First, Booth et al. fail to disclose "determining a probability of a correct diagnosis for the test suite using the database". In fact, Booth et al. fail to disclose "determining a probability of a correct diagnosis" in any context. As such, Booth et al. similarly do not disclose "determining a probability of a correct diagnosis for a modified test suite ...", as claimed in Claim 7. Second, since Booth et al. fail to disclose "determining a probability of a correct diagnosis for a modified test suite", Booth et al. cannot disclose "computing an efficacy value for a modified test suite using the determined probabilities", as claimed in Claim 7. Third and following this analysis, since Booth et al. fail to disclose "computing an efficacy value ... using the determined probabilities", then Booth et al. cannot disclose "generating a list of deletable tests using the computed efficacy values", as claimed in Claim 7.

Claim 10 is separately patentable over Booth et al. for several reasons, contrary to that contended by the Examiner. First, Booth et al. fail to disclose "determining a probability of a correct diagnosis" in any context, as discussed hereinabove for Claim 7. Second, Booth et al. do not disclose "determining a probability of an incorrect diagnosis for the test suite ...", as claimed in Claim 10. Third, since Booth et al. fail to disclose determining a probability of either or both of a correct diagnosis or an incorrect diagnosis", Booth et al. cannot disclose "creating a list of test to add from

the determined correct and incorrect probabilities for the test suite", as claimed in Claim 10.

If Booth et al. fail to disclose each element of the claim under consideration, as arranged in the claim, then a person of ordinary skill in the field of the invention would find a difference between the claimed invention and the reference disclosure. *W.L. Gore & Associates v. Garlock*; *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.;* and *Scripts Clinic & Research Found. V. Genentech Inc.*, all cited *supra*. Therefore, the Examiner has failed to establish a case of *prima facie* anticipation of Claims 5-7 and 10 by Booth et al. and Claims 5-7 and 10 are each separately patentable.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Claims 5-7 and 10 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claims 5-7 and 10 on the grounds that such a rejection is unsupported by the reference and the case law.

With respect to Claim 11, Claim 11 is directed to a method of evaluating a diagnostic efficacy of a test suite of a model-based diagnostic testing system.

In finally rejecting Claim 11, the Examiner contended that "Booth et al. teach the method of evaluating a diagnostic efficacy of the test suite using a probability of a diagnosis (e.g., Col. 11, lines 24-64); creating a simulation database 124 of the test suite (e.g., Col. 6, lines 49-54); determining a probability of a correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database (e.g., Col. 11, lines 15-18, lines 27-29); using the determined a [*sic*] probability to evaluate the test suite (e.g., Col. 9, lines 14-15).

Contrary to that contended by the Examiner, at Col. 6, lines 49-54 Booth et al. do not disclose "creating a simulation database 124 of the test suite". Instead at Col. 6, lines 52-54, Booth et al. disclose that "simulated **data** 124" may be employed in "test suite analysis and model debug analysis" (emphasis added). Simulated data refers to information on component failure used instead of TFC historical data in establishing weights for candidate diagnoses (e.g., see discussion of "diagnosability index", Col. 9, lines 1-12).

Furthermore, contrary to that contended by the Examiner, at Col. 11, lines 15-18 and lines 27-29, Booth et al. do not disclose "determining a probability of a correct

diagnosis and a probability of an incorrect diagnosis for the test suite using the database". Instead, as discussed hereinabove, at Col. 11, lines 15-18, Booth et al. disclose that the diagnostic system maintains various lists, while at Col. 11, lines 27-29, Booth et al. recommend against "altering prior failure probabilities to correct a single diagnosis". It has been already discussed above at least with respect to Claim 1 that neither in these cited passages nor anywhere else in the teachings of Booth et al. is there a disclosure of "probability of a correct diagnosis and a probability of an incorrect diagnosis" or a disclosure of determining the same "using the simulation database", as is further recited in Claim 11.

Moreover, contrary to that contended by the Examiner, at Col. 9, lines 14-15, Booth et al. do not disclose "using the determined probability to evaluate the test suite", as recited in Claim 11. Instead, as already discussed above, Booth et al. disclose "the test suite may be evaluated for overall accuracy by analysis of historical data (FIG. 1, 126)" at Col. 9, lines 14-15, which Appellant submits is in no way related to using "the determined probability to evaluate the test suite", as recited in Claim 11.

If Booth et al. fail to disclose each element of the claim under consideration, as arranged in the claim, then a person of ordinary skill in the field of the invention would find a difference between the claimed invention and the reference disclosure. *W.L. Gore & Associates v. Garlock*; *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*; and *Scripts Clinic & Research Found. V. Genentech Inc.*, all cited *supra*. Therefore, the Examiner has failed to establish a case of *prima facie* anticipation of Claim 11 by Booth et al. and Claim 11 is separately patentable over Booth et al.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Claim 11 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claim 11 on the grounds that such a rejection is unsupported by the reference and the case law.

With respect to Claims 32-36, Claims 32-36 are directed to a system that determines efficacy of a test suite of a model-based diagnostic testing system. In finally rejecting Claim 32, the Examiner contended that "Booth et al. teach a test system that identifies potential problems with the test suite, and also identifies

probable modeling errors based on incorrect diagnoses comprising: a processor (e.g., Col. 6, lines 66-67); a memory (e.g., Col. 7, lines 52-55); and a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor (e.g., Col. 6, lines 61-65, Col. 7, lines 10-18), implement evaluating the test suite (e.g., Col. 9, lines 14-15) using a probability of one or both of a correct diagnosis and incorrect diagnosis to determine the efficacy (e.g., Col. 11, lines 15-18, lines 27-29)."

However, contrary to that contended by the Examiner, at Col. 7, lines 52-55, Booth et al. do not disclose "a memory" in which a computer program is stored. Instead, in the passage at Col. 7, lines 52-55, Booth et al. disclose "[i]n the example system model in the background section, the CPU is exercised by only one operation (access_memory) and only 20% of the functionality is exercised". The reference in this cited passage to memory actually relates a printed circuit board having a CPU and random access memory (RAM) (i.e., the 'UUT') and not to "a memory" of the system that stores the computer program, as recited in Claim 32. The Examiner has made an obvious error in attempting to identify a disclosure of "a memory" by Booth et al. Clearly, the requirement that the reference must disclose all elements "as arranged in the claim" is not met. *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.,* cited *supra.*

Notwithstanding the error regarding "a memory" in the disclosure of Booth et al., contrary to that contended by the Examiner, at the above-referenced cited passages (i.e., Col. 6, lines 61-65, Col. 7, lines 10-18, Col. 9, lines 14-15 and Col. 11, lines 15-18 and lines 27-29), Booth et al. do not disclose "a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor, implement evaluating the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite to determine the efficacy", as recited in Claim 32.

As has been discussed hereinabove at length, there is no disclosure of "a probability of one or both of a correct diagnosis and an incorrect diagnosis" found in Booth et al., whether in the particular passages cited by the Examiner in rejecting Claim 32 or in the disclosure of Booth et al. as a whole. As such, Booth et al. do not and cannot disclose using such probabilities to "determine the efficacy".

Appellant submits that the Examiner erred in finally rejecting Claim 32 in that the Examiner has failed to establish a case for *prima facie* anticipation under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079). In particular, failure by Booth et al. to disclose each limitation of Claim 32 (see *W.L. Gore & Associates v. Garlock*, cited *supra*), as arranged in the claim (see *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, cited *supra*), means that a person of ordinary skill in the field of the invention would find a difference between the claimed invention and the reference disclosure. *Scripts Clinic & Research Found. V. Genentech Inc.*, cited *supra*. Therefore, the rejection of Claim 32 under 35 U.S.C. §102(b) is unsupported by the reference and the case law.

Claims 33-36 ultimately depend from Claim 32 and include all of the limitations of base Claim 32. The Examiner has failed to establish a case of *prima facie* anticipation of Claims 33-36 by Booth et al. for at least the same reasons set forth above for Claim 32. Moreover, each of Claims 34-36 is separately patentable over Booth et al. due to the additional elements introduced by each of Claims 34-36.

In finally rejecting Claim 34, the Examiner contended that "Booth et al. teach the method of evaluating a diagnostic efficacy of the test suite using a probability of a diagnosis (e.g., Col. 11, lines 24-64); creating a simulation database 124 of the test suite (e.g., Col. 6, lines 49-54); determining a probability of a correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database (e.g., Col. 11, lines 15-18, lines 27-29); using the determined a [*sic*] probability to evaluate the test suite (e.g., Col. 9, lines 14-15).

Contrary to that contended by the Examiner, Claim 34 is directed to a system and actually recites that the instructions that evaluate the test suite comprise "creating a simulation database of the test suite, determining a probability of one or both of a correct diagnosis and an incorrect diagnosis using the database, and using the determined probability to evaluate the test suite". As discussed hereinabove with respect to Claim 11, at Col. 6, lines 49-54, Booth et al. do not disclose "creating a simulation database 124 of the test suite" contrary to that contended by the Examiner. Instead, at Col. 6, lines 52-54, Booth et al. disclose that "simulated **data** 124" may be employed in "test suite analysis and model debug analysis" (emphasis added). Simulated data refers to information on component failure used instead of TFC

historical data in establishing weights for candidate diagnoses (e.g., see discussion of "diagnosability index", Col. 9, lines 1-12).

Furthermore, contrary to that contended by the Examiner, at Col. 11, lines 15-18 and lines 27-29, Booth et al. do not disclose "determining a probability of one or both of a correct diagnosis and an incorrect diagnosis using the database". Instead, as discussed hereinabove, at Col. 11, lines 15-18, Booth et al. disclose that the diagnostic system maintains various lists. while at Col. 11, lines 27-29, Booth et al. recommend against "altering prior failure probabilities to correct a single diagnosis". As has been discussed already above, neither in these cited passages nor anywhere else in the teachings of Booth et al. is there a disclosure of "a probability of one or both of a correct diagnosis and an incorrect diagnosis" or a disclosure of determining the same "using the database" as recited in Claim 34.

Moreover, at Col. 9, lines 14-15, Booth et al. do not disclose "using the determined a [*sic*] probability to evaluate the test suite", contrary to that contended by the Examiner. Instead, as discussed hereinabove, Booth et al. disclose therein "the test suite may be evaluated for overall accuracy by analysis of historical data (FIG. 1, 126)", which is in no way related to using "the determined probability to evaluate the test suite", as recited in Claim 34.

Failure by Booth et al. to disclose each element of Claim 34, as arranged in the claim, means that the Examiner has failed to establish a case of *prima facie* anticipation of Claim 34 by Booth et al. As such, a person of ordinary skill in the field of the invention would find a difference between the claimed invention and the reference disclosure. *Scripts Clinic & Research Found. V. Genentech Inc.*, cited *supra*.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Claim 34 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claim 34 on the grounds that such a rejection is unsupported by the reference and the case law. Therefore, Appellant submits that Claim 34 is separately patentable.

In finally rejecting Claim 35, the Examiner contended that "Booth et al. teach suggesting a test comprising: creating a simulation database 124 of the test suite; determining a probability of a correct diagnosis (e.g., Col. 6, lines 49-54) and a

probability of an incorrect diagnosis for the test suite using the database (e.g., Col. 9, lines 33-61); and creating a list of suggested tests from the determined probabilities (e.g., Col. 10, lines 66-Col. 11, line 35)."

Contrary to that contended by the Examiner, Claim 35 actually recites "wherein using the determined probability of both a correct diagnosis and an incorrect diagnosis comprises creating a list of suggested tests to add to the test suite, each suggested test having an associated test coverage". As stated above for at least Claim 32, nowhere in Booth et al. is there taught "a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite". As such, Booth et al. do not and cannot disclose "using the determined probability of both a correct diagnosis and an incorrect diagnosis comprises creating a list of suggested tests to add to the test suite, each suggested test having an associated test coverage", as recited in Claim 35. This is so at least because Booth et al. do not disclose, "determining a probability of one or both of a correct diagnosis and an incorrect diagnosis" as has been established hereinabove for at least Claim 34.

As was discussed hereinabove with respect to at least Claim 3, at Col. 6, lines 49-54 cited by the Examiner, Booth et al. instead actually disclose "[a]lso in the invention, if a diagnosis 110 is not consistent with the TFC 114, then automated model debug 120 analyzes the model 108 for possible changes to the model that would result in a correct diagnosis 110. Test suite analysis 116 and model debug analysis 120 can be used with simulated data 124 or with historical data 126 when available". Therefore, Booth et al. fail to teach "suggesting a test comprising: creating a simulation database 124 of the test suite; determining a probability of a correct diagnosis" at Col. 6, lines 49-54, as contended by the Examiner.

Failure by Booth et al. to disclose each element of Claim 35, as arranged in the claim, means that a person of ordinary skill in the field of the invention would find a difference between the claimed invention and the reference disclosure. *W.L. Gore & Associates v. Garlock*; *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*; *Scripts Clinic & Research Found. V. Genentech Inc.*, all cited *supra*. Therefore, the Examiner has failed to establish a case of *prima facie* anticipation of Claim 35 by Booth et al.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Claim 35 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claim 35 on the grounds that such a rejection is unsupported by the reference and the case law. Therefore, Appellant submits that Claim 35 is separately patentable.

In finally rejecting Claim 36, the Examiner contended that "Booth et al. teach identifying a test to delete from the test suite (e.g., Col. 10, line 66-Col. 11, line 15), determining a probability of a correct diagnosis for a modified test suite using the database (e.g., Col. 11, lines 24-35, lines 67), the modified test suite (e.g., Col. 10, lines 66-67) having a selected test removed from the test suite (e.g., Col. 11, lines 4-10); computing an efficacy value associated with the selected test using the determined probabilities of a correct diagnosis for the test suite and the modified test suite (e.g., Col. 5, lines 49-59); and generating a list of deletable tests and associated efficacy values (e.g., Col. 9, lines 38-40, Col. 11, lines 15-19).

Contrary to that contended by the Examiner, Claim 36 is directed to a system and actually recites that instructions that evaluate the test suite further comprise "determining a probability of a correct diagnosis for a modified test suite using the database, the modified test suite having a selected test removed from the test suite; and wherein using the determined probability comprises: computing an efficacy value for the modified test suite using the determined probability of a correct diagnosis for both the test suite and the modified test suite; and generating a list of tests to delete from the test suite based on the computed efficacy value". Nowhere in Booth et al. is there taught "determining a probability of a correct diagnosis for a modified test suite using the database, the modified test suite having a selected test removed from the test suite" or "computing an efficacy value for the modified test suite using the determined probability ..." or even "generating a list of tests to delete from the test suite based on the computed efficacy value", as claimed in Claim 36.

Specifically, as discussed hereinabove at least with respect to Claims 3, 5, 7, 34 and 35, Booth et al. do not disclose "determining a probability of a correct diagnosis" in any context whatsoever. As such, Booth et al. similarly do not disclose "determining a probability of a correct diagnosis for a modified test suite", as claimed in Claim 36. Since Booth et al. fail to disclose "determining a probability of a correct

diagnosis for a modified test suite", then Booth et al. do not and cannot disclose "using the determined probabilities" in any context including, but not limited to, "generating a list of tests to delete from the test suite based on the computed efficacy value", as claimed in Claim 36.

Since Booth et al. do not disclose all of the elements of Claim 36, then the Examiner has failed to establish a case of *prima facie* anticipation of Claim 36 by Booth et al. *W.L. Gore & Associates v. Garlock*, cited *supra*. Moreover, the Examiner has failed to show that each element of Claim 36 is disclosed by Booth et al. as arranged in the claim. *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, cited *supra*. As provided above, the courts have held that there can be no difference between the claimed invention and the reference disclosure as viewed by a person of ordinary skill in the field of the invention. *Scripts Clinic & Research Found. V. Genentech Inc.*, cited *supra*.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Claim 36 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claim 36 on the grounds that such a rejection is unsupported by the reference and the case law. Therefore, Appellant submits that Claim 36 is separately patentable.

In view of the discussion hereinabove, Appellant submits that the Examiner erred in finally rejecting Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079) for failing to establish a case for *prima facie* anticipation. Appellant respectfully submits that the rejection of Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) should have been withdrawn.

Issue 2: Whether the Examiner's final rejection of Claims 8 and 32 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (USPN 5,922,079) in view of Kanevsky et al. (U.S. Pat. No. 6,167,352) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* obviousness.

Appellant submits that the Examiner, in finally rejecting Claims 8 and 32 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (US Pat. No. 5,922,079) in view of Kanevsky et al. (US Pat. No. 6,167,352), has erred for failing to establish a case for *prima facie* obviousness as detailed hereinbelow.

Specifically, the Examiner has failed to show that 1) there is "some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings"; 2) there is "a reasonable expectation of success" in modifying or combining the reference teachings; and 3) the prior art reference (or references when combined) "teach or suggest ***all*** the claim limitations". (MPEP, Section 2142, *ESTABLISHING A PRIMA FACIE CASE OF OBVIOUSNESS*) Moreover, the Examiner must establish that the teaching or suggestion to make the claimed combination and of the reasonable expectation of success is both "found in the prior art, and not based on applicant's disclosure". *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir.1991). Moreover, as stated in MPEP 2143.01, "Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab,* 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."

In finally rejecting Claim 8, the Examiner admitted that Booth et al. "fail to teach step [*sic*] of determining a probability for a modified test suite is repeated for a plurality of modified test suites, each modified test suite of the plurality being the test suite having a different selected test removed". However, the Examiner contended that "Kanevsky et al. teach step [*sic*] of determining a probability for a modified test suite is repeated for a plurality of modified test suites, each modified test suite of the plurality being the test suite having a different selected test removed (e.g., Col. 9, lines 57)". The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time the invention was made to include such a step "taught by Kanevsky et al. in an automated analysis and troubleshooting system for identifying potential problems with the test suite of Booth et al. for purpose of

providing an automated tools [*sic*] for selection of one or more next tests to apply to a device under test (Kanevsky et al., Col. 1, lines 9-11)".

With respect to motivation, the Examiner has failed to show that there exists in the references themselves, either explicitly or implicitly, or in the knowledge generally available to one of ordinary skill in the art, some teaching, suggestion, or motivation to combine or modify the teachings of the references as suggested by the Examiner. Instead, the Examiner has contended that it would be obvious to combine Kanevsky et al. with Booth et al. for the purpose of "providing an automated tools for selection of one or more next tests to apply to a device under test". The Examiner relies on that stated in the *Field of Invention* section of Kanevsky et al. (Col. 1, lines 9-11) for the contended purpose. Appellant submits that such statement by Kanevsky et al. in their *Field of Invention* section, while possibly a result of combining, fails to rise to a level of a suggestion or motivation to combine or modify the teachings of Booth et al. "found in the prior art, and not based on applicant's disclosure". *In re Vaeck*, cited *supra*.

Moreover, the purpose contended by the Examiner of "providing an automated tools for selection of one or more next tests to apply to a device under test" would hardly motivate one skilled in the art to combine Booth et al. with Kanevsky et al. since the proposed purpose has nothing to do with the goals or functions of either Booth et al. or the instant invention. Specifically, Booth et al. disclose "[a]n automated analysis system that identifies detectability problems, diagnosability problems, and possible ways to change rank order of diagnoses in a diagnostic system and makes the problems and possible improvements visible to test programmers to aid in test improvement" (Abstract). As such, Booth et al. are concerned with what tests are performed by a test suite and how those tests interact with the DUT to possibly identify problems with the test suite. On the other hand, Kanevsky et al. disclose a model-based diagnostic system and how a test suite of the diagnostic system interacts with the DUT, specifically in terms of approaches to "best next test selection" (e.g., Col. 1, lines 10-11 and Col. 2, line 2 to Col. 3, line 1). Thus, one skilled in the art would not be motivated to look to a model-based diagnostic system of Kanevsky et al. to modify an automated system of Booth et al. used to analyze such systems in an effort achieve that claimed in Clam 8.

Furthermore, Booth et al. does not teach or suggest, either explicitly or implicitly, a desirability of reordering tests within a test suite. Booth et al. never consider using a reordering of tests in the test suite. Instead Booth et al. are entirely concerned with analyzing and troubleshooting a test suite in terms of diagnosability and debugging "based on incorrect diagnoses" using the test suite (col. 9, lines 33-37). As such, there is simply no reason for one skilled in the art to combine Booth et al. with Kanevsky et al. to provide "automated tools for selection of one or more next tests to apply to a device under test", as contended by the Examiner.

With respect to an expectation of success, Appellant submits that the Examiner has failed to show a reasonable expectation of success in modifying or combining the reference teachings found in Kanevsky et al. or Booth et al. "and not based on applicant's disclosure". *In re Vaeck*, cited *supra*.

Moreover, assuming *arguendo* that the teachings of Booth et al. were combined with that taught by Kanevsky et al., as contended by the Examiner, the combination would not "teach or suggest ***all*** the claim limitations" of Appellant's Claim 8. Claim 8 is dependent from Claims 1, 6 and 7. It has been established above that, contrary to that contended by the Examiner, Booth et al. fail to disclose, or even suggest, the elements of Claims 1, 6 and 7 in that Booth et al. are silent on "using" or "determining" "a probability of a correct diagnosis ...", for example. Moreover, Kanevsky et al. fail to disclose or suggest these elements that are lacking in the teachings of Booth et al. Furthermore, contrary to that contended by the Examiner, at Col. 9, line 57, Kanevsky et al. do not disclose all of that lacking from Booth et al. with respect to the recited elements of Claim 8.

Specifically, at Col. 9, lines 55-57, Kanevsky et al. disclose "[t]hereafter *j* and L*j* are written to the next test table 26 as the entries for the first and second columns, respectively, of **the next available row of the next test table 26**" (**emphasis** added to distinguish line 57 cited by the Examiner). It is unclear why the Examiner cited the above-referenced passage. Whether viewed in isolation or in context, contrary to that contended by the Examiner, the above-cited passage of Kanevsky et al. in no way discloses or suggests "determining a probability for a modified test suite is repeated for a plurality of modified test suites, each modified test suite of the plurality being the test suite having a different selected test removed", as recited in Claim 8. In fact

as a whole, the teachings of Kanevsky et al. are silent on and do not suggest "a modified test suite". Therefore, the teachings of Booth et al. in view of Kanevsky et al. do not teach or suggest ***all*** the claim limitations of Claim 8, as required for establishing a case for *prima facie* obviousness.

As such, the Examiner has failed to establish a case for *prima facie* obviousness of Claim 8 with respect to Booth et al. in view of Kanevsky et al. for at least the reasons discussed hereinabove. Having failed to establish the case for *prima facie* obviousness, the Examiner erred in finally rejecting Claim 8 under 35 U.S.C. 103(a) on the grounds that the rejection is unsupported by the cited references and/or by knowledge generally available to one of ordinary skill in the art.

In finally rejecting Claim 32, the Examiner contended that "Kanevsky et al. teach a Monte Carol [*sic*] simulation (e.g., Col. 4, lines 40-52, Col. 5, lines 18-30)". The Examiner did not further explain the final rejection of Claim 32.

However, contrary to that contended by the Examiner, Appellant's Claim 32 does not recite "a Monte Carol (in actuality, 'Monte Carlo') simulation". Instead, Claim 32 recites "... a processor; a memory; and a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor, implement evaluating the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite to determine the efficacy". Claim 32 is neither concerned with nor recites a Monte Carlo simulation. As such, there would seem to be no basis whatsoever for rejecting Claim 32 under 35 U.S.C. 103(a) with respect to Booth et al. in view of Kanevsky et al.

Appellants gave the Examiner an opportunity to correct any error in the reason for the rejection of Claim 32 in Appellant's Amendment dated and filed 8/29/03. However, the Examiner chose to finally reject Claim 32 for the same, albeit clearly incorrect, reason in the Final Office Action mailed 10/20/03.

Assuming *arguendo* that the Examiner meant to cite a different reason for rejecting Claim 32 under 35 U.S.C. 103(a), Appellant still submits that neither Booth et al. nor Kanevsky et al. disclose or suggest "using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite to determine efficacy", as claimed in Claim 32. As such, the Examiner has failed to provide a motivation to

combine Booth et al. and Kanevsky et al., an expectation of success in such a combination, and that if combined, all elements recited in Claim 32 are disclosed or suggested by the cited references.

As such, the Examiner has failed to establish a case for *prima facie* obviousness of Claim 32 with respect to Booth et al. in view of Kanevsky et al. for at least the reasons discussed hereinabove. Having failed to establish the case for *prima facie* obviousness, the Examiner erred in finally rejecting Claim 32 under 35 U.S.C. 103(a) on the grounds that the rejection is unsupported by the cited references and/or by knowledge generally available to one of ordinary skill in the art. Appellant respectfully submits that the final rejection of Claims 8 and 32 under 35 U.S.C. §103(a) should have been withdrawn.

Issue 3: Whether the Examiner's final rejection of Claim 38 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (USPN 5,922,079) in view of Preist et al. (U.S. Pat. No. 5,808,919) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* obviousness.

Appellant submits that the Examiner, in finally rejecting Claim 38 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (US Pat. No. 5,922,079) in view of Preist et al. (US Pat. No. 5,808,919), has erred for failing to establish a case for *prima facie* obviousness, as detailed hereinbelow.

In finally rejecting Claim 38, the Examiner admitted that "Booth et al. fail to teach a list of respective tests, the lists being represented in one or both of human readable form or machine readable form". The Examiner further contended that "Preist et al. teach a list of respective tests, the lists being represented in human readable form (e.g., Col 6, lines 30-41)". The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the lists of Priest et al. in an automated analysis and troubleshooting system of Booth et al. for the "purpose of providing a diagnostic system for diagnosing the cause of failures of functional tests made on a system under test wherein the system under test comprises a plurality of interacting components and wherein the diagnostic system comprises means for interpreting test results according to a set of operations which are involved in carrying out the tests (Preist et al., Col. 1, lines 61-67)".

Appellant respectfully submits that the Examiner has failed to show: 1) a reasonable motivation to combine or modify; 2) an expectation of success; and 3) that in such combination, all elements claimed in Claim 38 are disclosed or suggested.

Notwithstanding that the requirements for a motivation and an expectation of success are not established by the Examiner with reasonable clarity as being found in the references and not in Appellant's disclosure, Appellant submits that the Examiner has failed to show that all of the elements recited in Appellant's Claim 38 are disclosed or suggested by the combination of Booth et al. and Preist et al.

For example, assuming *arguendo* that Booth et al. where combined with Preist et al., as contended by the Examiner, the combination still would not "teach or suggest ***all*** the claim limitations" of Claim 38. In particular, Claim 38 ultimately depends from and includes all of the limitations of Claim 32. Claim 32 recites in part "a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor, implement evaluating the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite to determine the efficacy". As has been discussed and established hereinabove, Booth et al. do not disclose or suggest at least "a probability of one or both of a correct diagnosis and an incorrect diagnosis" or "using" such a probability to "determine the efficacy". Similarly, Preist et al. fail to disclose or suggest at least these elements recited in Claim 32 that are lacking in the teachings of Booth et al. For at least the same reasons set forth above for Claim 32, the combination of teachings of Booth et al. and Preist et al. fail to disclose or suggest all of the limitations of Claim 38.

As such, the Examiner has failed to establish a case for *prima facie* obviousness of Claim 38 with respect to Booth et al. in view of Preist et al. Having failed to establish the case for *prima facie* obviousness, the Examiner erred in finally rejecting Claim 38 under 35 U.S.C. 103(a) as unpatentable over Booth et al in view of Preist et al. on the grounds that the rejection is unsupported by the cited references and/or by knowledge generally available to one of ordinary skill in the art. Appellant respectfully submits that the final rejection of Claim 38 under 35 U.S.C. §103(a) should have been withdrawn.

Issue 4: Whether the Examiner's final rejection of Claims 31 and 37 should be reversed on the grounds that the Examiner has not provided a specific rejection or reason therefor under any statute or rule.

Appellant submits that the Examiner has erred in finally rejecting Claims 31 and 37 for failing to provide any grounds for the rejection thereof. Without grounds for rejection being specified by the Examiner, Appellant can not comment on the merits, but only respond by pointing this error out to the Examiner. In particular, due to the Examiner's error, Appellant has not been afforded procedural due process under 35 U.S.C. §132 of the patent statute that requires applicant be adequately notified of the reasons for the rejection of claims so that applicant may decide how to proceed. *In re Ludtke*, 441 F.2d 660, 662, 169 USPQ 563, 565 (CCPA 1971).

With respect to Claim 31, Appellant did point out the error to the Examiner in Appellant's Amendment dated and filed 8/29/03 with the USPTO. However, the Examiner chose to finally reject Claim 31 for no stated reason in the Final Office Action mailed 10/20/03 rather than consider Appellant's remarks thereon and correct the error.

With respect to Claim 37, Appellant did not notice the first instance of this error in the Examiner's First Action dated 6/19/03. Unfortunately, the Examiner repeated the error in the Examiner's Final Action dated 10/20/03. Appellant respectfully submits that the Examiner should have provided a statement of reasons for the rejection before finally rejecting Claim 37.

Moreover, Claim 31 is ultimately dependent from base Claim 11 and Claim 37 is ultimately dependent from base Claim 32. At least for the reasons set forth above for the patentability of base Claims 11 and 32 over the final rejections applied thereto under 35 U.S.C. §102(b) and 35 U.S.C. §103(a), Appellant respectfully submits that the final rejection of Claims 31 and 37 should be withdrawn.

Issue 5: Whether the objection raised by the Examiner to Claims 9 and 12-30 as being dependent upon a rejected based claim should be withdrawn in light of the allowability of the respective base claims as established hereinabove.

The Examiner objected to Claims 9 and 12-30 as being dependent from a rejected base claim and noted that the claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Appellant appreciates the Examiner's indication of allowable subject matter in Claims 9 and 12-30. However, Appellant submits that the base claims from which Claims 9 and 12-30 are dependent are patentable over the cited references as established hereinabove. Therefore, Claims 9 and 12-30 are believed to be allowable as originally filed. As such, the objection raised by the Examiner should be withdrawn.

In particular, Claim 9 depends from Claim 8 and ultimately depends from Claim 1. Appellant has demonstrated hereinabove that the Examiner failed to establish a *prima facie* case of anticipation with respect to Claim 1. Further Appellant has demonstrated hereinabove that the Examiner failed to establish a *prima facie* case of obviousness with respect to Claim 8. Therefore, the Examiner erred in finally rejecting both Claims 1 and 8. As such Appellant submits that Claim 9 is drawn to allowable subject matter without being rewritten in independent form.

Claims 12-30 ultimately depend from Claim 11. Appellants have demonstrated hereinabove that the Examiner failed to establish a *prima facie* case of anticipation with respect to Claim 11. Therefore, the Examiner erred in finally rejecting Claim 11. As such, Appellant submits that Claims 12-30 are drawn to allowable subject matter without being rewritten in independent form.

In light of the remarks above, Appellant respectfully submits that the objection to Claims 9 and 12-30 should be withdrawn.

RELIEF SOUGHT

Appellant has demonstrated that the Examiner failed to establish *prima facie* anticipation of any of Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b). Further, Appellant has demonstrated that the Examiner failed to establish *prima facie* obviousness of any of Claims 8, 32 and 38 under 35 U.S.C. §103(a). Moreover, Appellant has established that the Examiner erred in finally rejecting Claims 31 and 37 without provided grounds therefor. Also, Appellant has established that objected to Claims 9 and 12-30 are drawn to allowable subject matter without being rewritten in independent form. As such, Appellant has demonstrated that Claims 1-38 are separately patentable, as provided above. Accordingly, Appellant respectfully requests that the Board of Patent Appeals and Interferences reverse each of the

rejection of Claim 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b), the rejections of Claims 8, 32 and 38 under 35 U.S.C. §103(a), and the rejection of Claims 31 and 37 under no grounds, and withdraw the objection to Claims 9 and 12-30.

Respectfully submitted,

Lee A. Barford

By: _____
J. Michael Johnson
Agent for Applicant(s)
Registration No. 37,856

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

_____ 2/12/04
Signature **Date**

Appendix to Appeal Brief

Listing of Claims

Claim 1: A method of determining a revision of a test suite of a model-based diagnostic testing system comprising:

evaluating a diagnostic efficacy of the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite.

Claim 2: The method of Claim 1, wherein the evaluation comprises:

suggesting a test to add to the test suite to adjust an overall test coverage of the test suite.

Claim 3: The method of Claim 2, wherein suggesting a test comprises:

creating a simulation database of the test suite;

determining a probability of a correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database; and

creating a list of suggested tests from the determined probabilities.

Claim 4: The method of Claim 3, wherein each suggested test on the list comprises a test coverage.

Claim 5: The method of Claim 3, wherein the evaluation further comprises:

identifying a test to delete from the test suite that comprises:

determining a probability of a correct diagnosis for a modified test suite using the database, the modified test suite having a selected test removed from the test suite;

computing an efficacy value associated with the selected test using the determined probabilities of a correct diagnosis for the test suite and the modified test suite; and

generating a list of deletable tests and associated efficacy values.

Claim 6: The method of Claim 1, wherein the evaluation comprises:

identifying a test to delete from the test suite, the deletable test having a minimal effect on an overall diagnostic efficacy of the test suite.

Claim 7: The method of Claim 6, wherein identifying a test comprises:

creating a simulation database of the test suite;

determining a probability of a correct diagnosis for the test suite using the database;

determining a probability of a correct diagnosis for a modified test suite using the database, wherein the modified test suite is the test suite having a selected test removed;

computing an efficacy value for the modified test suite using the determined probabilities; and

generating a list of deletable tests using the computed efficacy values.

Claim 8: The method of Claim 7, wherein determining a probability for a modified test suite is repeated for a plurality of modified test suites, each modified test suite of the plurality being the test suite having a different selected test removed.

Claim 9: The method of Claim 8, wherein the selected test associated with the modified test suite having a low computed efficacy value relative to other modified test suites is the deletable test.

Claim 10: The method of Claim 7, wherein evaluating further comprises:

suggesting a test to add to the test suite to adjust an overall test coverage of the test suite that comprises:

determining a probability of an incorrect diagnosis for the test suite using the database; and

creating a list of tests to add from the determined correct and incorrect probabilities for the test suite.

Claim 11: A method of evaluating a diagnostic efficacy of a test suite of a model-based diagnostic testing system comprising:

creating a simulation database of the test suite;

determining a probability of one or both of a correct diagnosis and an incorrect diagnosis for the test suite using the database; and

using the determined probability to evaluate the test suite.

Claim 12: The method of Claim 11, wherein creating a simulation database comprises:

simulating an application of the test suite to a device under test, the device under test comprising one or more components; and

recording a probable result of the application in the simulation database, the simulation database being represented by a table having a plurality of columns and a

plurality of rows, the plurality of columns comprising a component pattern, a test result pattern, and a number of occurrences,

wherein the component pattern encodes which component is good or bad, each component of the device under test being represented by a unique position number within the component pattern,

wherein the test result pattern encodes which of the tests of the test suite failed or passed, each test in the test suite being represented by a unique position within the test result pattern,

wherein the number of occurrences represents a number of times that a given combination of the component pattern and the test result pattern occurred during a simulation, the number of occurrences being an integer greater than or equal to zero, and

wherein each row of the plurality of rows corresponds to a different unique pattern of good and bad components.

Claim 13: The method of Claim 12, wherein determining a probability of one or both of a correct diagnosis and an incorrect diagnosis comprises:

copying to a database copy only those rows of the created simulation database with only one bad component in the component pattern column, all other components in the respective row being good;

sorting the database copy based on the test pattern column, such that the rows with a given test pattern are adjacent to one another, the adjacent rows forming a group of rows;

examining each group of rows to locate a row within each group having a largest number of occurrences relative to other rows within the respective group; and

assigning a diagnosis *d* to each group, the diagnosis *d* being the position number of the bad component for the located row.

Claim 14: The method of Claim 13, wherein determining a probability of one or both of a correct diagnosis and an incorrect diagnosis further comprises creating and initializing a matrix *M* such that matrix elements $M(i, j)$ of the matrix *M* are equal to zero for all *i* and *j*, where *i* is an integer that ranges from one to $m+1$ and where *j* is an integer that ranges from one to *m*, where *m* is the number of tests in the test suite.

Claim 15: The method of Claim 14, wherein for each group having a test pattern that represents no failed tests, determining a probability further comprises:

adding iteratively for each row *r* in the group the number of occurrences value of the row *r* to a current value of the matrix element $M(m+1, b)$ to generate a next value of the matrix element $M(m+1, b)$, where *b* is a position number of the bad component for the row *r*.

Claim 16: The method of Claim 15, wherein for each group having a test pattern that represents at least one failed test, determining a probability further comprises:

adding iteratively for each row *r* in the group the number of occurrences value of the row *r* to a current value of the matrix element $M(d, b)$ to generate a next value of the matrix element $M(d, b)$.

Claim 17: The method of Claim 16, wherein the determined probability of a correct diagnosis P_{corr} is calculated using

$$P_{corr} = \Sigma/E$$

where Σ is a sum of diagonal elements $M(i, i)$ of the matrix M for i equals one to m and E is a sum of all number of occurrence values in the database copy.

Claim 18: The method of Claim 17, wherein using the determined probability to evaluate the test suite comprises:

suggesting a test to add to the test suite to improve diagnostic efficacy.

Claim 19: The method of Claim 18, wherein suggesting a test comprises:

finding a relatively largest value element $M(i,j)$ in the matrix M, where i is not equal to j, the element $M(i,j)$ representing the probability of incorrectly diagnosing component i as the bad component when component j is actually bad; and

suggesting a test t having high coverage for component i and one of either low coverage for component j, if j is not equal to m+1, or coverage being irrelevant, if j is equal to m+1.

Claim 20: The method of Claim 19, wherein suggesting a test further comprises creating a list of suggested tests, wherein creating a list comprises:

repeating finding and suggesting for each element of a set of largest value elements $M(i,j)$, a test being suggested for each element of the set of elements $M(i,j)$; and

computing a score for each of the suggested tests, the score being computed by dividing the element value $M(i,j)$ by the total accumulated number of occurrences E.

Claim 21: The method of Claim 20, wherein the list of suggested tests is represented in one or both of human readable form or machine-readable form.

Claim 22: The method of Claim 17, wherein using the determined probability to evaluate the test suite comprises:

identifying a test t of the test suite that may be deleted from the test suite.

Claim 23: The method of Claim 22, wherein for identifying a test t to delete from the test suite, the method further comprises:

determining a probability of a correct diagnosis $P_{corr,t}$ for a modified test suite using the database, the modified test suite having a selected test t removed from the test suite;

computing an efficacy value for the modified test suite using the determined probabilities for the test suite and for the modified test suite; and

generating a list of deletable tests, the deletable tests having a lowest associated efficacy relative to efficacies of other tests in the test suite.

Claim 24: The method of Claim 23, wherein determining a probability of a correct diagnosis $P_{corr,t}$ for a modified test suite associated with each of the tests t in the test suite comprises using a modified database created from the database copy, wherein the modified database is created comprising:

copying the database copy into another database copy;

selecting a test t to remove from the test suite;

deleting a position from each test pattern associated with the selected test t from the other database copy; and

copying rows of the other database copy into a modified database, such that any rows that have identical values for the component pattern and the test pattern are combined together in the modified database,

wherein in each row of the modified database that represents a set of combined rows from the other database copy the number of occurrences is a sum of the number of occurrence values for the combined rows.

Claim 25: The method of Claim 24, wherein the probability of a correct diagnosis $P_{corr,t}$ for each of the modified test suites is determined in a manner analogous to determining the probability of a correct diagnosis P_{corr} for the test suite.

Claim 26: The method of Claim 24, wherein determining a probability of a correct diagnosis $P_{corr,t}$ for the modified test suite T' using the modified database comprises:

summing a largest number of occurrences value v_{max} found for each unique test pattern value within the modified database; and

dividing the v_{max} sum by a total number of occurrences E_t, where the total number of occurrences E_t is the sum of all numbers of occurrences in the modified database.

Claim 27: The method of Claim 23, wherein computing an efficacy value for each of the tests in the test suite comprises computing a difference between the determined probability of a correct diagnosis $P_{corr,t}$ for the modified test suite corresponding to a selected test t and the determined probability of a correct diagnosis P_{corr} for the test suite.

Claim 28: The method of Claim 27, wherein the computed efficacy $\varepsilon(t)$ value further comprises a cost metric $c(t)$ associated with the test t, where $\varepsilon(t) = c(t)\cdot(P_{corr,t} - P_{corr})$.

Claim 29: The method of Claim 27, wherein the generated list of deletable tests comprises an associated efficacy value for each of the deletable tests.

Claim 30: The method of Claim 23, wherein the generated list is represented in one or both of human readable form and in machine-readable form.

Claim 31: The method of Claim 11, wherein the created simulation database comprises a Monte Carol simulation of the device under test model, the database having a set of entries, each entry having a field for a number-of-occurrences value, a field for a test result pattern, and a field for a component state pattern.

Claim 32: A system that determines efficacy of a test suite of a model-based diagnostic testing system comprising:

a processor;

a memory; and

a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor, implement evaluating the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite to determine the efficacy.

Claim 33: The system of Claim 32, wherein the instructions that evaluate the test suite comprise one or both of suggesting a test to add to the test suite, and identifying a test to delete from the test suite.

Claim 34: The system of Claim 32, wherein the instructions that evaluate the test suite comprise:

creating a simulation database of the test suite;

determining a probability of one or both of a correct diagnosis and an incorrect diagnosis using the database; and

using the determined probability to evaluate the test suite.

Claim 35: The system of Claim 34, wherein using the determined probability of both a correct diagnosis and an incorrect diagnosis comprises creating a list of suggested tests to add to the test suite, each suggested test having an associated test coverage.

Claim 36: The system of Claim 34, wherein the instructions that evaluate the test suite further comprise:

determining a probability of a correct diagnosis for a modified test suite using the database, the modified test suite having a selected test removed from the test suite;

and wherein using the determined probability comprises:

computing an efficacy value for the modified test suite using the determined probability of a correct diagnosis for both the test suite and the modified test suite; and

generating a list of tests to delete from the test suite based on the computed efficacy value.

Claim 37: The system of Claim 36, wherein determining a probability of a correct diagnosis for a modified test suite is repeated for different modified test suites, each different modified test suite having an associated different selected test being removed.

Claim 38: The system of Claim 33, wherein suggesting a test to add to the test suite and identifying a test to delete from the test suite each comprise a list of respective tests, the lists being represented in one or both of human readable form or machine-readable form.

* * *

AGILENT TECHNOLOGIES, INC.
Legal Department, M/S DL429
Intellectual Property Administration
P. O. Box 7599
Loveland, CO 80537-0599

PATENT APPLICATION
ATTORNEY DOCKET NO. **10980101-1**

APPEAL BRIEF dated **Feb. 12, 2004**

OFFICIAL

Appl. No.	:	10/053,748	Confirmation No. 5462
Applicant	:	Lee A. Barford	
Filed	:	Jan. 18, 2002	
TC/A.U.	:	2800/2863	
Examiner	:	John H. Le	
Docket No.	:	10980101-1	
Customer No.	:	022878	
Title	:	REVISING A TEST SUITE USING DIAGNOSTIC EFFICACY EVALUATION	

Mail Stop Appeal Briefs - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANT'S BRIEF ON APPEAL

Sir:

This is an appeal under 37 CFR 1.191 from a Final Rejection in an Office Action mailed 10/20/03. A Notice of Appeal was filed on 12/12/03. Jurisdiction over this appeal resides in the Board of Patent Appeals and Interferences under 35 U.S.C. §134. An oral hearing was not requested.

A Certificate of Mailing or Transmission is provided on the last page of this document and applies to this document and any Appendix attached hereto.

REAL PARTY IN INTEREST

The real party in interest is Agilent Technologies, Inc., of Palo Alto, CA.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences.

STATUS OF THE CLAIMS

The claims for consideration on appeal in the present application are Claims 1-38. Claims 1 and 32 were amended in an "Amendment" filed by facsimile transmission on Aug. 29, 2003. The claims as amended are presented herewith in the attached Appendix to Appeal Brief.

STATUS OF THE AMENDMENTS

In a Final Office Action mailed 10/20/03, the Examiner indicated that the amendments made to the claims in Appellants' Amendment of 8/29/03 were accepted and entered.

SUMMARY OF THE INVENTION

According to various embodiments of the present invention, a revision of a test suite of a diagnostic testing system is determined by evaluating diagnostic efficacy and accuracy of the test suite (page 7, lines 5-7). In particular, some embodiments suggest tests to add to the test suite that may improve diagnostic efficacy and accuracy of the testing system (page 7, lines 7-9). Adding the suggested test or tests may improve the ability of the testing system to accurately diagnosis a failure detected in a device under test (DUT). Some embodiments alternatively or further establish a relative diagnostic value of tests in a test suite of the testing system. The diagnostic value of the tests identifies tests that may be deleted from the test suite with minimal impact on an overall diagnostic efficacy of the test suite. In particular, tests determined to have a low relative efficacy value may be eliminated without adversely affecting overall diagnostic efficacy to reduce a cost, a complexity, and/or a redundancy of the tests performed by the testing system according to some

embodiments of the present invention (page 7, lines 9-11). The various embodiments of the present invention are applicable to virtually any model-based diagnostic testing system, but are particularly well suited for use in conjunction with automated testing systems, especially those used to test electronic systems.

In some embodiments of the present invention, a method of suggesting a test to add to a test suite of a diagnostic testing system is provided (FIG. 1, 100, page 9, lines 24-28). In particular, the method suggests a potential test to add to the test suite and provides an indication of a relative increase in an overall diagnostic efficacy of the test suite associated with adding such a test to the test suite (page 7, lines 7-9). The relative increase in overall diagnostic efficacy is provided as a 'score' for each suggested test (page 12, lines 12-16). In some embodiments, a list of suggested tests is generated that includes an assigned score for each suggested test in the list, thereby enabling a choice of which test or tests to add based on the score and other factors, such as constraints imposed by the DUT and/or available test equipment (page 12, lines 24-28).

The method of suggesting a test to add comprises creating a simulation database for the DUT and the test suite (FIG. 1, 110; page 9, lines 28-31; page 10, lines 6-18). The method of suggesting a test to add further comprises determining from the simulation database a probability of correct and incorrect diagnoses for the test suite (FIG. 1, 120; page 10, lines 19-22). The probabilities of correct and incorrect diagnoses are preferably determined for as many combinations of correct and incorrect diagnoses as are possible for the DUT (page 11, lines 1-9). The method of suggesting a test to add further comprises suggesting a test to add from the determined probabilities (FIG. 1, 130; page 11, lines 10-11). Suggesting comprises creating a list of suggested tests to be added to the test suite. In some embodiments, each suggested test on the list is provided in terms of what component(s) of the DUT it covers (page 11, lines 12-14, and lines 19-24).

In other embodiments of the present invention, a method of identifying a test to delete from a test suite is provided (FIG. 2, 200; page 17, lines 11-13). The method determines diagnostic efficacies of tests of the test suite (page 17, lines 13-14). In particular, the method of identifying generates a list of tests, each test on the list being associated with a relative diagnostic efficacy or diagnostic value of the test. The list

may be used to identify the test that may be safely eliminated as having low diagnostic efficacy (page 17, lines 15-18).

The method of identifying a test to delete comprises creating a simulation database for the DUT and the test suite (FIG. 2, 210; page 17, lines 21-22). The method further comprises determining a probability of a correct diagnosis using the test suite (FIG. 2, 220; page 18, lines 3-4 and lines 7-11). The method further comprises determining a probability of a correct diagnosis for a modified test suite (FIG. 2, 230; page 18, lines 12-13). The modified test suite is the test suite with a selected test deleted from the suite (page 18, line 13-16). Determining a probability of a correct diagnosis for the modified test suite is preferably repeated with a different one of the tests in the test suite being the selected test that is deleted (page 18, lines 16-19). The method further comprises computing an efficacy value for each of the tests in the test suite (FIG. 2, 240; page 18, lines 22-23). The method further comprises identifying a test to delete from the determined probabilities and computed efficacy values (page 19, lines 10-11). Identifying comprises generating a list of the tests and associated efficacy values (FIG. 2, 250; page 19, lines 1-2). Tests with low efficacy values may be deleted from the suite without significantly reducing the overall diagnostic efficacy of the test suite (page 19, line 11-13).

In yet other embodiments of the present invention, a system that determines a diagnostic efficacy of a test suite of a testing system is provided (FIG.3, 300, 300'; page 23, lines 21-22). The system determines an efficacy of tests in a test suite and either or both suggests tests to add and identifies tests to delete from the test suite (page 23, lines 23-29). The system comprises a processor, a memory and a computer program stored in the memory (FIG. 3, 310, 320, 330, 330'; page 23, line 30 to page 24, line 13). The processor accesses the computer program from memory and executes the computer program. The computer program comprises instructions that when executed implement determining the efficacy of tests in a test suite. The instructions may further implement suggesting tests to add and/or identifying a test to delete from the test suite (page 24, line 21 to page 25, line 2; page 25, lines 3-14). In some embodiments, the instructions implement any of the described embodiments of the method of the present invention (page 24, lines 13-20). The system of the present

invention may be a stand-alone system or may be incorporated into a testing system for testing a DUT (page 24, lines 3-4).

ISSUES

Issue 1: Whether the Examiner's final rejection of Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* anticipation.

Issue 2: Whether the Examiner's final rejection of Claims 8 and 32 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (USPN 5,922,079) in view of Kanevsky et al. (U.S. Pat. No. 6,167,352) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* obviousness.

Issue 3: Whether the Examiner's final rejection of Claim 38 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (USPN 5,922,079) in view of Preist et al. (U.S. Pat. No. 5,808,919) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* obviousness.

Issue 4: Whether the Examiner's final rejection of Claims 31 and 37 should be reversed on the grounds that the Examiner has not provided a specific rejection or reason therefor under any statute or rule.

Issue 5: Whether the objection raised by the Examiner to Claims 9 and 12-30 as being dependent upon a rejected based claim should be withdrawn in light of the allowability of the respective base claims as established herein below.

GROUPING OF CLAIMS

For each ground of rejection which Appellants contests hereinbelow for which the rejection ground applies to more than one claim, the additional claims do not stand or fall together to the extent the claims are separately identified and argued below. Specifically, Appellants submit that Claims 1-7, 10-11 and 32-36 do not stand or fall together as to the rejection under 35 U.S.C. §102(b) and that Claims 8, 32 and 38 do not stand or fall together as to the rejections under 35 U.S.C. §103(a). Separately patentable as to the respective rejections under 35 U.S.C. §102 and 35 U.S.C. §103

are explained in more detail herein below for particular claims and/or groups of claims.

ARGUMENT

Prior to beginning a discussion of and remarks regarding the above-presented issues, a brief overview of the content and scope of one of the references, Booth et al. (US Pat. No. 5,922,079), cited by the Examiner is provided. Following the overview of Booth et al., a brief review of a meaning of probability in the context of the instant application is presented.

Booth et al. disclose an automated analysis and trouble shooting system that identifies potential problems with a test suite of a model-based diagnostic system and also identifies probable modeling errors based on incorrect diagnoses (col. 5, lines 36-40). According to Booth et al., the disclosed automated analysis includes a detectability analysis having a first stage that flags components and subcomponents with no coverage in the test suite (col. 7, lines 31-33) and a second stage that either assigns a numerical value to components having inadequate coverage or simply flags such components (col. 7, lines 42-45). Detectability, according to Booth et al., is essentially an examination of test coverages of individual tests in a test suite with a focus on finding components of the unit under test having poor coverage.

The automated analysis and troubleshooting system of Booth et al. further includes diagnosability. Booth et al. define diagnosability as the ability to uniquely identify faulty components within a larger set of candidates (col. 7, lines 65-67). Specifically, Booth et al. disclose diagnosability "as the ability to uniquely identify faulty components with a larger set of candidates" or simply to "discriminate between components" (col. 7, lines 65-67; col. 8, lines 9-12). As such, diagnosability is a further examination of test coverages in an attempt to find components with overlapping coverages that yield an inability to distinguish failures in the components.

Additionally, according to Booth et al., the automated analysis also provides a means for debugging the model "based on incorrect diagnoses" (col. 9, lines 33-37). The 'model' includes information on "tests, operations, components tested by operations, and utilization of the tested components by the associated operations" (col. 6, lines 38-41). Moreover, Booth et al. explicitly state that "with diagnosis as a

guide, the UUT (unit under test) is repaired" and that "[d]uring repair, the TFC (true failure cause) may be determined" (col. 6, lines 41-43). Booth et al. explain that debugging involves modifying operation violation penalties used in setting diagnoses weights. Modifying is used to move a given diagnosis up or down in a list of possible diagnoses (col. 10, line 66 to col. 11, line 23). The operation violations may employ data including a failure probability for one or more components in the UUT. The goal of moving candidate diagnoses up or down in the list is to insure that a highest weighted candidate diagnosis is the true failure cause (TFC) (col. 9, lines 41-45).

In the instant application as well as in the discussion hereinbelow, Appellant employs the term 'probability' in the conventional sense. Namely, 'probability', $P(a)$, is defined as the limit of a relative frequency n_a/n of an occurrence of event a, wherein n_a is a number of times event a is observed to occur during n trials or experiments. Put another way, $P(a)$ is the likelihood of event a occurring in a number of experiments. A probability of an event is distinct from the event itself. For example, during an experiment involving the flipping of a coin, the probability of the event 'heads' is one half. The probability of 'heads' is a number that describes the likelihood that the event 'heads' will occur during any given instance of flipping the coin. Similarly, the probability of the event 'heads' is distinct from the probability of the event 'tails' even though the two probabilities happen have equal values for the coin flipping example.

Thus in accordance with the instant patent application, a probability of one or both of a correct diagnosis and an incorrect diagnosis may be determined from a simulation database by "dividing the number-of-occurrences of the particular diagnosis by a total number-of-occurrences of all diagnoses included in the determination" (Appellant's specification page 11, lines 6-7). In some embodiments, the simulation database represents the results of applying the test suite to test a number of devices under test (DUTs) or simulated DUTs, wherein DUTs in each instance of applying have different failure causes. The event of a correct diagnosis is distinct from the probability of a correct diagnosis. More to the point, the probability of a correct diagnosis is developed or determined, in most case, using the test suite to test a large number of DUTs or simulated DUTs representing a large number of failure conditions (e.g., different failed and non-failed components) and observing or

counting a number of correct diagnoses relative to a total number of diagnoses. Similarly, the probability of an incorrect diagnosis is distinct from the event of an incorrect diagnosis.

With the background provided above, each of the Issues listed hereinabove are addressed below.

Issue 1: Whether the Examiner's final rejection of Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* anticipation.

Appellant submits that the Examiner, in rejecting Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079), has erred for failing to establish a case for *prima facie* anticipation. Specifically, the Examiner has failed to show that there is "no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention." *Scripts Clinic & Research Found. V. Genentech Inc.*, 927 F.2d 1565, 18 USPQ 2d 1001, 1010 (Fed. Cir. 1991). Moreover, the Examiner has not demonstrated for any of Claims 1-7, 10-11 and 32-36, which are rejected under 35 U.S.C. §102(b), that there is a disclosure in a single prior art reference of "each element of the claim under consideration". *W.L. Gore & Associates v. Garlock*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983). That notwithstanding, the Examiner furthermore has failed to show that each element disclosed by the reference is "arranged as in the claim" as required by the court in *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ (Fed. Cir. 1984) at 481, 485. As such, the rejection of Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079) is unsupported by the case law. As stated by the Federal Circuit "if the examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of patent". *In re Oelrich*, 977, F.2d 1443, 24 USPQ 2d 1443 (Fed. Cir. 1992).

With respect to Claims 1-7 and 10, directed to a method of determining a revision of a test suite of a model-based diagnostic testing system, the Examiner has provided no supportable finding that Booth et al. disclose "evaluating a diagnostic

efficacy of the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite" as recited in Claim 1. In particular, Booth et al. do not disclose or suggest a probability of a correct diagnosis or a probability of an incorrect diagnosis or the use of the same in evaluating a diagnostic efficacy of the test suite.

In finally rejecting Claim 1, the Examiner contended that Booth et al. teach an automated analysis and troubleshooting system and stated that the system, "identifies potential problems with the test suite, and also identifies probable modeling errors based on incorrect diagnoses (e.g., Col. 5, lines 35-40), the method comprising step of evaluating a diagnostic efficacy of the test suite (e.g., Col. 9, lines 14-15) using a probability of one or both of a correct diagnosis and incorrect diagnosis by the test suite (e.g., Col. 11, lines 15-18, lines 27-29)".

However, contrary to that contended by the Examiner, Booth et al. disclose neither "a probability of one or both of a correct diagnosis and incorrect diagnosis by the test suite" nor "evaluating a diagnostic efficacy of the test suite" using the probability. At Col. 9, lines 14-15, Booth et al. instead disclose that "the test suite may be evaluated for overall accuracy by analysis of historical data (FIG. 1, 126)". At Col. 11, lines 15-18, Booth et al. further disclose "[t]he diagnostic system maintains lists of violated operations, of passing and failing test, and of candidate diagnoses and their associated weights and penalties". Moreover, at Col. 11, lines 27-29, Booth et al. disclose "[a]s a result, altering prior failure probabilities to correct a single diagnosis is rarely appropriate (and not depicted in FIG. 3)".

According to Booth et al., the term 'historical data' means 'historical TFC (i.e., true failure cause) data'. Historical TFC data is related to a "diagnosability index" that "may be computed from the frequency with which two candidate diagnoses are assigned identical weights by the model-based diagnostic system over a set of representative failures" (e.g., see Abstract and Col. 9, line 5 of Booth et al.). Further, Booth et al. define 'operation' as "a process or action carried out by one or more functional tests" (Col. 2, lines 11-12). A 'violated operation' is defined as an operation that "fails in one test, causing the entire test to fail, yet passes in another test" (Col. 8, lines 21-23). According to Booth et al., 'passing and failing tests' are just that, tests that either pass or fail during an application of the test suite to a unit

under test (UUT) while 'candidate diagnoses' are defined as "a minimal set of components, which, if faulty, is capable of explaining all failing test results" (Col. 3, lines 42-44). 'Weights and penalties' are assigned to candidate diagnoses to rank or order the individual candidate diagnoses developed by the diagnostic system (e.g., see discussion beginning at Col. 3, line 56 through Col 5, line 8). The reference to "prior failure probabilities" by Booth et al. at Col. 11, lines 27-29, refers to a failure probability observed in historical information for a particular candidate diagnosis and involves "the probability of components involved in the candidate diagnosis failing given only that some tests have failed" (e.g., see discussion of equation (1) and equation (2), Col. 3, line 65 through Col. 4, line 64).

As such and in direct conflict with that contended by the Examiner, nowhere in Booth et al., either in the portions cited by the Examiner or anywhere else in USPN 5,922,079 for that matter, is there a disclosure of a 'probability of a correct diagnosis' or disclosure of a 'probability of an incorrect diagnosis' or a disclosure of using one or both such probabilities in 'evaluating a diagnostic efficacy of the test suite'. The terms 'lists', 'violation operations', 'passing and failing tests', 'candidate diagnoses', or 'weights and penalties associated with candidate diagnoses' are not probabilities. Furthermore, notwithstanding the admonition of Booth et al. that "altering prior failure probabilities to correct a single diagnosis is rarely appropriate", 'prior failure probabilities' are not probabilities of a correct diagnosis or an incorrect diagnosis.

Given the discussion hereinabove, Appellant respectfully submits that the Examiner erred in finally rejecting Claim 1 under 35 U.S.C. §102(b) because the legal requirements for a showing of *prima facie* anticipation under 35 U.S.C. §102(b) have not been met. In particular, Booth et al. fail to disclose or suggest each element of Claim 1 (*W.L. Gore & Associates v. Garlock*, cited *supra*) as arranged in the claim, (*Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, cited *supra*), such that there is a difference between that claimed in Claim 1 and Booth et al., as viewed by a person of ordinary skill in the field of the invention (*Scripts Clinic & Research Found. V. Genentech Inc.*, cited *supra*). Therefore, the Examiner has failed to establish a case of *prima facie* anticipation of Claim 1 by Booth et al.

Claim 2 ultimately depends from and includes all of the limitations of base Claim 1. Notwithstanding additional limitations introduced in Claim 2, a case for

prima facie anticipation has not been established for Claim 2 for at least the same reasons set forth above for Claim 1.

In finally rejecting Claim 3, the Examiner contended that "Booth et al. teach suggesting a test comprising: creating a simulation database 124 of the test suite; determining a probability of a correct diagnosis (e.g., Col. 6, lines 49-54) and a probability of an incorrect diagnosis for the test suite using the database (e.g., Col. 9, lines 33-61); and creating a list of suggested tests from the determined probabilities (e.g., Col. 10, lines 66-Col. 11, line 35)."

However, at Col. 6, lines 49-54, Booth et al. actually disclose "[a]lso in the invention, if a diagnosis 110 is not consistent with the TFC 114, then automated model debug 120 analyzes the model 108 for possible changes to the model that would result in a correct diagnosis 110. Test suite analysis 116 and model debug analysis 120 can be used with simulated data 124 or with historical data 126 when available".

Contrary to that contended by the Examiner, nowhere in the above-referenced passage of Booth et al. (cited by the Examiner) is "determining a probability of a correct diagnosis ..." taught or suggested. Similarly, at Col. 9, lines 33-61, Booth et al. fail to disclose "... and a probability of an incorrect diagnosis for the test suite using the database". For that matter and as discussed at length hereinabove with respect to Claim 1, Booth et al. do not even disclose a probability of either a correct diagnosis or an incorrect diagnosis. Thus, Booth et al. do not and cannot disclose "determining a probability of a correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database", as claimed in Appellant's Claim 3.

Further contrary to the Examiner's contention, at Col. 10, line 66 – Col 11, line 35, Booth et al. fail to disclose "creating a list of suggested tests from the determined probabilities", as claimed in Claim 3. In fact, since Booth et al. fail to disclose or suggest the determination of such probabilities, then Booth et al. fail to disclose creating a list of suggested test therefrom.

Since Booth et al. do not disclose or suggest all the elements claimed in Claim 3, then the Examiner has failed to establish a case of *prima facie* anticipation of Claim 3 by Booth et al. *W.L. Gore & Associates v. Garlock*, cited *supra*. Moreover, Booth et al. do not disclose the claimed elements of Claim 3 as arranged in the claim.

Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co., cited *supra*. In fact, Appellant submits that Booth et al. do not disclose any of the elements as claimed in Claim 3. Therefore, a person of ordinary skill in the field of the invention would find that there is a difference between that claimed in Claim 3 and that taught by Booth et al. *Scripts Clinic & Research Found. V. Genentech Inc.*, cited *supra*.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Appellant's Claim 3 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claim 3 on the grounds that such a rejection is unsupported by the reference.

Claim 4 depends from and includes all of the limitations of at least Claim 3. Notwithstanding additional limitations introduced in Claim 4, a case for *prima facie* anticipation has not been established for Claim 4 for at least the same reasons set forth above for Claim 3.

In finally rejecting Claims 5-7, and 10, the Examiner contended that "Booth et al. teach identifying a test to delete from the test suite (e.g., Col. 10, line 66-Col. 11, line 15), determining a probability of a correct diagnosis for a modified test suite using the database (e.g., Col. 11, lines 24-35, lines 67), the modified test suite (e.g., Col. 10, lines 66-67) having a selected test removed from the test suite (e.g., Col. 11, lines 4-10); computing an efficacy value associated with the selected test using the determined probabilities of a correct diagnosis for the test suite and the modified test suite (e.g., Col. 5, lines 49-59); and generating a list of deletable tests and associated efficacy values (e.g., Col. 9, lines 38-40, Col. 11, lines 15-19).

While rejected together by the Examiner, Claim 5 is directly dependent from Claim 3, while Claim 6 is directly dependent from Claim 1. Claim 7 is directly dependent from Claim 6 and Claim 10 is directly dependent from Claim 7.

Claim 5 is separately patentable over Booth et al. for several reasons, contrary to that contended by the Examiner. First, as discussed hereinabove for Claim 3, Booth et al. do not disclose "determining a probability of a correct diagnosis" in any context. As such, Booth et al. similarly do not disclose "determining a probability of a correct diagnosis for a modified test suite ...", as claimed in Claim 5. Second, since Booth et al. fail to disclose "determining a probability of a correct diagnosis for a modified test suite", Booth et al. cannot disclose "computing an efficacy value associated with the

selected test using the determined probabilities of a correct diagnosis for the test suite and the modified test suite". Third and following this analysis, since Booth et al. fail to disclose "computing an efficacy value ... using the determined probabilities ...", then Booth et al. cannot disclose "generating a list of deletable tests and associated efficacy values".

Claim 6 is separately patentable over Booth et al. contrary to that contended by the Examiner. First, Booth et al. do not disclose "evaluating a diagnostic efficacy of the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite", as discussed hereinabove for Claim 1. Second, Booth et al. similarly do not disclose "identifying a test to delete from the test suite, the deletable test having a minimal effect on an overall diagnostic efficacy of the test suite", as claimed in Claim 6.

Claim 7 is separately patentable over Booth et al. for several reasons, contrary to that contended by the Examiner. First, Booth et al. fail to disclose "determining a probability of a correct diagnosis for the test suite using the database". In fact, Booth et al. fail to disclose "determining a probability of a correct diagnosis" in any context. As such, Booth et al. similarly do not disclose "determining a probability of a correct diagnosis for a modified test suite ...", as claimed in Claim 7. Second, since Booth et al. fail to disclose "determining a probability of a correct diagnosis for a modified test suite", Booth et al. cannot disclose "computing an efficacy value for a modified test suite using the determined probabilities", as claimed in Claim 7. Third and following this analysis, since Booth et al. fail to disclose "computing an efficacy value ... using the determined probabilities", then Booth et al. cannot disclose "generating a list of deletable tests using the computed efficacy values", as claimed in Claim 7.

Claim 10 is separately patentable over Booth et al. for several reasons, contrary to that contended by the Examiner. First, Booth et al. fail to disclose "determining a probability of a correct diagnosis" in any context, as discussed hereinabove for Claim 7. Second, Booth et al. do not disclose "determining a probability of an incorrect diagnosis for the test suite ...", as claimed in Claim 10. Third, since Booth et al. fail to disclose determining a probability of either or both of a correct diagnosis or an incorrect diagnosis", Booth et al. cannot disclose "creating a list of test to add from

the determined correct and incorrect probabilities for the test suite", as claimed in Claim 10.

If Booth et al. fail to disclose each element of the claim under consideration, as arranged in the claim, then a person of ordinary skill in the field of the invention would find a difference between the claimed invention and the reference disclosure. *W.L. Gore & Associates v. Garlock*; *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.;* and *Scripts Clinic & Research Found. V. Genentech Inc.*, all cited *supra*. Therefore, the Examiner has failed to establish a case of *prima facie* anticipation of Claims 5-7 and 10 by Booth et al. and Claims 5-7 and 10 are each separately patentable.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Claims 5-7 and 10 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claims 5-7 and 10 on the grounds that such a rejection is unsupported by the reference and the case law.

With respect to Claim 11, Claim 11 is directed to a method of evaluating a diagnostic efficacy of a test suite of a model-based diagnostic testing system.

In finally rejecting Claim 11, the Examiner contended that "Booth et al. teach the method of evaluating a diagnostic efficacy of the test suite using a probability of a diagnosis (e.g., Col. 11, lines 24-64); creating a simulation database 124 of the test suite (e.g., Col. 6, lines 49-54); determining a probability of a correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database (e.g., Col. 11, lines 15-18, lines 27-29); using the determined a [*sic*] probability to evaluate the test suite (e.g., Col. 9, lines 14-15).

Contrary to that contended by the Examiner, at Col. 6, lines 49-54 Booth et al. do not disclose "creating a simulation database 124 of the test suite". Instead at Col. 6, lines 52-54, Booth et al. disclose that "simulated **data** 124" may be employed in "test suite analysis and model debug analysis" (emphasis added). Simulated data refers to information on component failure used instead of TFC historical data in establishing weights for candidate diagnoses (e.g., see discussion of "diagnosability index", Col. 9, lines 1-12).

Furthermore, contrary to that contended by the Examiner, at Col. 11, lines 15-18 and lines 27-29, Booth et al. do not disclose "determining a probability of a correct

diagnosis and a probability of an incorrect diagnosis for the test suite using the database". Instead, as discussed hereinabove, at Col. 11, lines 15-18, Booth et al. disclose that the diagnostic system maintains various lists, while at Col. 11, lines 27-29, Booth et al. recommend against "altering prior failure probabilities to correct a single diagnosis". It has been already discussed above at least with respect to Claim 1 that neither in these cited passages nor anywhere else in the teachings of Booth et al. is there a disclosure of "probability of a correct diagnosis and a probability of an incorrect diagnosis" or a disclosure of determining the same "using the simulation database", as is further recited in Claim 11.

Moreover, contrary to that contended by the Examiner, at Col. 9, lines 14-15, Booth et al. do not disclose "using the determined probability to evaluate the test suite", as recited in Claim 11. Instead, as already discussed above, Booth et al. disclose "the test suite may be evaluated for overall accuracy by analysis of historical data (FIG. 1, 126)" at Col. 9, lines 14-15, which Appellant submits is in no way related to using "the determined probability to evaluate the test suite", as recited in Claim 11.

If Booth et al. fail to disclose each element of the claim under consideration, as arranged in the claim, then a person of ordinary skill in the field of the invention would find a difference between the claimed invention and the reference disclosure. *W.L. Gore & Associates v. Garlock*; *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*; and *Scripts Clinic & Research Found. V. Genentech Inc.*, all cited *supra*. Therefore, the Examiner has failed to establish a case of *prima facie* anticipation of Claim 11 by Booth et al. and Claim 11 is separately patentable over Booth et al.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Claim 11 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claim 11 on the grounds that such a rejection is unsupported by the reference and the case law.

With respect to Claims 32-36, Claims 32-36 are directed to a system that determines efficacy of a test suite of a model-based diagnostic testing system. In finally rejecting Claim 32, the Examiner contended that "Booth et al. teach a test system that identifies potential problems with the test suite, and also identifies

probable modeling errors based on incorrect diagnoses comprising: a processor (e.g., Col. 6, lines 66-67); a memory (e.g., Col. 7, lines 52-55); and a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor (e.g., Col. 6, lines 61-65, Col. 7, lines 10-18), implement evaluating the test suite (e.g., Col. 9, lines 14-15) using a probability of one or both of a correct diagnosis and incorrect diagnosis to determine the efficacy (e.g., Col. 11, lines 15-18, lines 27-29)."

However, contrary to that contended by the Examiner, at Col. 7, lines 52-55, Booth et al. do not disclose "a memory" in which a computer program is stored. Instead, in the passage at Col. 7, lines 52-55, Booth et al. disclose "[i]n the example system model in the background section, the CPU is exercised by only one operation (access_memory) and only 20% of the functionality is exercised". The reference in this cited passage to memory actually relates a printed circuit board having a CPU and random access memory (RAM) (i.e., the 'UUT') and not to "a memory" of the system that stores the computer program, as recited in Claim 32. The Examiner has made an obvious error in attempting to identify a disclosure of "a memory" by Booth et al. Clearly, the requirement that the reference must disclose all elements "as arranged in the claim" is not met. *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.,* cited *supra*.

Notwithstanding the error regarding "a memory" in the disclosure of Booth et al., contrary to that contended by the Examiner, at the above-referenced cited passages (i.e., Col. 6, lines 61-65, Col. 7, lines 10-18, Col. 9, lines 14-15 and Col. 11, lines 15-18 and lines 27-29), Booth et al. do not disclose "a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor, implement evaluating the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite to determine the efficacy", as recited in Claim 32.

As has been discussed hereinabove at length, there is no disclosure of "a probability of one or both of a correct diagnosis and an incorrect diagnosis" found in Booth et al., whether in the particular passages cited by the Examiner in rejecting Claim 32 or in the disclosure of Booth et al. as a whole. As such, Booth et al. do not and cannot disclose using such probabilities to "determine the efficacy".

Appellant submits that the Examiner erred in finally rejecting Claim 32 in that the Examiner has failed to establish a case for *prima facie* anticipation under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079). In particular, failure by Booth et al. to disclose each limitation of Claim 32 (see *W.L. Gore & Associates v. Garlock*, cited *supra*), as arranged in the claim (see *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, cited *supra*), means that a person of ordinary skill in the field of the invention would find a difference between the claimed invention and the reference disclosure. *Scripts Clinic & Research Found. V. Genentech Inc.*, cited *supra*. Therefore, the rejection of Claim 32 under 35 U.S.C. §102(b) is unsupported by the reference and the case law.

Claims 33-36 ultimately depend from Claim 32 and include all of the limitations of base Claim 32. The Examiner has failed to establish a case of *prima facie* anticipation of Claims 33-36 by Booth et al. for at least the same reasons set forth above for Claim 32. Moreover, each of Claims 34-36 is separately patentable over Booth et al. due to the additional elements introduced by each of Claims 34-36.

In finally rejecting Claim 34, the Examiner contended that "Booth et al. teach the method of evaluating a diagnostic efficacy of the test suite using a probability of a diagnosis (e.g., Col. 11, lines 24-64); creating a simulation database 124 of the test suite (e.g., Col. 6, lines 49-54); determining a probability of a correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database (e.g., Col. 11, lines 15-18, lines 27-29); using the determined a [*sic*] probability to evaluate the test suite (e.g., Col. 9, lines 14-15).

Contrary to that contended by the Examiner, Claim 34 is directed to a system and actually recites that the instructions that evaluate the test suite comprise "creating a simulation database of the test suite, determining a probability of one or both of a correct diagnosis and an incorrect diagnosis using the database, and using the determined probability to evaluate the test suite". As discussed hereinabove with respect to Claim 11, at Col. 6, lines 49-54, Booth et al. do not disclose "creating a simulation database 124 of the test suite" contrary to that contended by the Examiner. Instead, at Col. 6, lines 52-54, Booth et al. disclose that "simulated **data** 124" may be employed in "test suite analysis and model debug analysis" (emphasis added). Simulated data refers to information on component failure used instead of TFC

historical data in establishing weights for candidate diagnoses (e.g., see discussion of "diagnosability index", Col. 9, lines 1-12).

Furthermore, contrary to that contended by the Examiner, at Col. 11, lines 15-18 and lines 27-29, Booth et al. do not disclose "determining a probability of one or both of a correct diagnosis and an incorrect diagnosis using the database". Instead, as discussed hereinabove, at Col. 11, lines 15-18, Booth et al. disclose that the diagnostic system maintains various lists. while at Col. 11, lines 27-29, Booth et al. recommend against "altering prior failure probabilities to correct a single diagnosis". As has been discussed already above, neither in these cited passages nor anywhere else in the teachings of Booth et al. is there a disclosure of "a probability of one or both of a correct diagnosis and an incorrect diagnosis" or a disclosure of determining the same "using the database" as recited in Claim 34.

Moreover, at Col. 9, lines 14-15, Booth et al. do not disclose "using the determined a [*sic*] probability to evaluate the test suite", contrary to that contended by the Examiner. Instead, as discussed hereinabove, Booth et al. disclose therein "the test suite may be evaluated for overall accuracy by analysis of historical data (FIG. 1, 126)", which is in no way related to using "the determined probability to evaluate the test suite", as recited in Claim 34.

Failure by Booth et al. to disclose each element of Claim 34, as arranged in the claim, means that the Examiner has failed to establish a case of *prima facie* anticipation of Claim 34 by Booth et al. As such, a person of ordinary skill in the field of the invention would find a difference between the claimed invention and the reference disclosure. *Scripts Clinic & Research Found. V. Genentech Inc.*, cited *supra*.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Claim 34 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claim 34 on the grounds that such a rejection is unsupported by the reference and the case law. Therefore, Appellant submits that Claim 34 is separately patentable.

In finally rejecting Claim 35, the Examiner contended that "Booth et al. teach suggesting a test comprising: creating a simulation database 124 of the test suite; determining a probability of a correct diagnosis (e.g., Col. 6, lines 49-54) and a

probability of an incorrect diagnosis for the test suite using the database (e.g., Col. 9, lines 33-61); and creating a list of suggested tests from the determined probabilities (e.g., Col. 10, lines 66-Col. 11, line 35)."

Contrary to that contended by the Examiner, Claim 35 actually recites "wherein using the determined probability of both a correct diagnosis and an incorrect diagnosis comprises creating a list of suggested tests to add to the test suite, each suggested test having an associated test coverage". As stated above for at least Claim 32, nowhere in Booth et al. is there taught "a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite". As such, Booth et al. do not and cannot disclose "using the determined probability of both a correct diagnosis and an incorrect diagnosis comprises creating a list of suggested tests to add to the test suite, each suggested test having an associated test coverage", as recited in Claim 35. This is so at least because Booth et al. do not disclose, "determining a probability of one or both of a correct diagnosis and an incorrect diagnosis" as has been established hereinabove for at least Claim 34.

As was discussed hereinabove with respect to at least Claim 3, at Col. 6, lines 49-54 cited by the Examiner, Booth et al. instead actually disclose "[a]lso in the invention, if a diagnosis 110 is not consistent with the TFC 114, then automated model debug 120 analyzes the model 108 for possible changes to the model that would result in a correct diagnosis 110. Test suite analysis 116 and model debug analysis 120 can be used with simulated data 124 or with historical data 126 when available". Therefore, Booth et al. fail to teach "suggesting a test comprising: creating a simulation database 124 of the test suite; determining a probability of a correct diagnosis" at Col. 6, lines 49-54, as contended by the Examiner.

Failure by Booth et al. to disclose each element of Claim 35, as arranged in the claim, means that a person of ordinary skill in the field of the invention would find a difference between the claimed invention and the reference disclosure. *W.L. Gore & Associates v. Garlock*; *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*; *Scripts Clinic & Research Found. V. Genentech Inc.*, all cited *supra*. Therefore, the Examiner has failed to establish a case of *prima facie* anticipation of Claim 35 by Booth et al.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Claim 35 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claim 35 on the grounds that such a rejection is unsupported by the reference and the case law. Therefore, Appellant submits that Claim 35 is separately patentable.

In finally rejecting Claim 36, the Examiner contended that "Booth et al. teach identifying a test to delete from the test suite (e.g., Col. 10, line 66-Col. 11, line 15), determining a probability of a correct diagnosis for a modified test suite using the database (e.g., Col. 11, lines 24-35, lines 67), the modified test suite (e.g., Col. 10, lines 66-67) having a selected test removed from the test suite (e.g., Col. 11, lines 4-10); computing an efficacy value associated with the selected test using the determined probabilities of a correct diagnosis for the test suite and the modified test suite (e.g., Col. 5, lines 49-59); and generating a list of deletable tests and associated efficacy values (e.g., Col. 9, lines 38-40, Col. 11, lines 15-19).

Contrary to that contended by the Examiner, Claim 36 is directed to a system and actually recites that instructions that evaluate the test suite further comprise "determining a probability of a correct diagnosis for a modified test suite using the database, the modified test suite having a selected test removed from the test suite; and wherein using the determined probability comprises: computing an efficacy value for the modified test suite using the determined probability of a correct diagnosis for both the test suite and the modified test suite; and generating a list of tests to delete from the test suite based on the computed efficacy value". Nowhere in Booth et al. is there taught "determining a probability of a correct diagnosis for a modified test suite using the database, the modified test suite having a selected test removed from the test suite" or "computing an efficacy value for the modified test suite using the determined probability ..." or even "generating a list of tests to delete from the test suite based on the computed efficacy value", as claimed in Claim 36.

Specifically, as discussed hereinabove at least with respect to Claims 3, 5, 7, 34 and 35, Booth et al. do not disclose "determining a probability of a correct diagnosis" in any context whatsoever. As such, Booth et al. similarly do not disclose "determining a probability of a correct diagnosis for a modified test suite", as claimed in Claim 36. Since Booth et al. fail to disclose "determining a probability of a correct

diagnosis for a modified test suite", then Booth et al. do not and cannot disclose "using the determined probabilities" in any context including, but not limited to, "generating a list of tests to delete from the test suite based on the computed efficacy value", as claimed in Claim 36.

Since Booth et al. do not disclose all of the elements of Claim 36, then the Examiner has failed to establish a case of *prima facie* anticipation of Claim 36 by Booth et al. *W.L. Gore & Associates v. Garlock*, cited *supra*. Moreover, the Examiner has failed to show that each element of Claim 36 is disclosed by Booth et al. as arranged in the claim. *Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, cited *supra*. As provided above, the courts have held that there can be no difference between the claimed invention and the reference disclosure as viewed by a person of ordinary skill in the field of the invention. *Scripts Clinic & Research Found. V. Genentech Inc.*, cited *supra*.

In light of the failure by the Examiner to establish a case of *prima facie* anticipation of Claim 36 by Booth et al., Appellant submits that the Examiner erred in finally rejecting Claim 36 on the grounds that such a rejection is unsupported by the reference and the case law. Therefore, Appellant submits that Claim 36 is separately patentable.

In view of the discussion hereinabove, Appellant submits that the Examiner erred in finally rejecting Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) as being anticipated by Booth et al. (US Pat. No. 5,922,079) for failing to establish a case for *prima facie* anticipation. Appellant respectfully submits that the rejection of Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b) should have been withdrawn.

Issue 2: Whether the Examiner's final rejection of Claims 8 and 32 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (USPN 5,922,079) in view of Kanevsky et al. (U.S. Pat. No. 6,167,352) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* obviousness.

Appellant submits that the Examiner, in finally rejecting Claims 8 and 32 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (US Pat. No. 5,922,079) in view of Kanevsky et al. (US Pat. No. 6,167,352), has erred for failing to establish a case for *prima facie* obviousness as detailed hereinbelow.

Specifically, the Examiner has failed to show that 1) there is "some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings"; 2) there is "a reasonable expectation of success" in modifying or combining the reference teachings; and 3) the prior art reference (or references when combined) "teach or suggest ***all*** the claim limitations". (MPEP, Section 2142, *ESTABLISHING A PRIMA FACIE CASE OF OBVIOUSNESS*) Moreover, the Examiner must establish that the teaching or suggestion to make the claimed combination and of the reasonable expectation of success is both "found in the prior art, and not based on applicant's disclosure". *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir.1991). Moreover, as stated in MPEP 2143.01, "Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. "The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art." *In re Kotzab,* 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000). See also *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992)."

In finally rejecting Claim 8, the Examiner admitted that Booth et al. "fail to teach step [*sic*] of determining a probability for a modified test suite is repeated for a plurality of modified test suites, each modified test suite of the plurality being the test suite having a different selected test removed". However, the Examiner contended that "Kanevsky et al. teach step [*sic*] of determining a probability for a modified test suite is repeated for a plurality of modified test suites, each modified test suite of the plurality being the test suite having a different selected test removed (e.g., Col. 9, lines 57)". The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time the invention was made to include such a step "taught by Kanevsky et al. in an automated analysis and troubleshooting system for identifying potential problems with the test suite of Booth et al. for purpose of

providing an automated tools [*sic*] for selection of one or more next tests to apply to a device under test (Kanevsky et al., Col. 1, lines 9-11)".

With respect to motivation, the Examiner has failed to show that there exists in the references themselves, either explicitly or implicitly, or in the knowledge generally available to one of ordinary skill in the art, some teaching, suggestion, or motivation to combine or modify the teachings of the references as suggested by the Examiner. Instead, the Examiner has contended that it would be obvious to combine Kanevsky et al. with Booth et al. for the purpose of "providing an automated tools for selection of one or more next tests to apply to a device under test". The Examiner relies on that stated in the *Field of Invention* section of Kanevsky et al. (Col. 1, lines 9-11) for the contended purpose. Appellant submits that such statement by Kanevsky et al. in their *Field of Invention* section, while possibly a result of combining, fails to rise to a level of a suggestion or motivation to combine or modify the teachings of Booth et al. "found in the prior art, and not based on applicant's disclosure". *In re Vaeck*, cited *supra*.

Moreover, the purpose contended by the Examiner of "providing an automated tools for selection of one or more next tests to apply to a device under test" would hardly motivate one skilled in the art to combine Booth et al. with Kanevsky et al. since the proposed purpose has nothing to do with the goals or functions of either Booth et al. or the instant invention. Specifically, Booth et al. disclose "[a]n automated analysis system that identifies detectability problems, diagnosability problems, and possible ways to change rank order of diagnoses in a diagnostic system and makes the problems and possible improvements visible to test programmers to aid in test improvement" (Abstract). As such, Booth et al. are concerned with what tests are performed by a test suite and how those tests interact with the DUT to possibly identify problems with the test suite. On the other hand, Kanevsky et al. disclose a model-based diagnostic system and how a test suite of the diagnostic system interacts with the DUT, specifically in terms of approaches to "best next test selection" (e.g., Col. 1, lines 10-11 and Col. 2, line 2 to Col. 3, line 1). Thus, one skilled in the art would not be motivated to look to a model-based diagnostic system of Kanevsky et al. to modify an automated system of Booth et al. used to analyze such systems in an effort achieve that claimed in Clam 8.

Furthermore, Booth et al. does not teach or suggest, either explicitly or implicitly, a desirability of reordering tests within a test suite. Booth et al. never consider using a reordering of tests in the test suite. Instead Booth et al. are entirely concerned with analyzing and troubleshooting a test suite in terms of diagnosability and debugging "based on incorrect diagnoses" using the test suite (col. 9, lines 33-37). As such, there is simply no reason for one skilled in the art to combine Booth et al. with Kanevsky et al. to provide "automated tools for selection of one or more next tests to apply to a device under test", as contended by the Examiner.

With respect to an expectation of success, Appellant submits that the Examiner has failed to show a reasonable expectation of success in modifying or combining the reference teachings found in Kanevsky et al. or Booth et al. "and not based on applicant's disclosure". *In re Vaeck*, cited *supra*.

Moreover, assuming *arguendo* that the teachings of Booth et al. were combined with that taught by Kanevsky et al., as contended by the Examiner, the combination would not "teach or suggest ***all*** the claim limitations" of Appellant's Claim 8. Claim 8 is dependent from Claims 1, 6 and 7. It has been established above that, contrary to that contended by the Examiner, Booth et al. fail to disclose, or even suggest, the elements of Claims 1, 6 and 7 in that Booth et al. are silent on "using" or "determining" "a probability of a correct diagnosis ...", for example. Moreover, Kanevsky et al. fail to disclose or suggest these elements that are lacking in the teachings of Booth et al. Furthermore, contrary to that contended by the Examiner, at Col. 9, line 57, Kanevsky et al. do not disclose all of that lacking from Booth et al. with respect to the recited elements of Claim 8.

Specifically, at Col. 9, lines 55-57, Kanevsky et al. disclose "[t]hereafter *j* and L*j* are written to the next test table 26 as the entries for the first and second columns, respectively, of **the next available row of the next test table 26**" (**emphasis** added to distinguish line 57 cited by the Examiner). It is unclear why the Examiner cited the above-referenced passage. Whether viewed in isolation or in context, contrary to that contended by the Examiner, the above-cited passage of Kanevsky et al. in no way discloses or suggests "determining a probability for a modified test suite is repeated for a plurality of modified test suites, each modified test suite of the plurality being the test suite having a different selected test removed", as recited in Claim 8. In fact

as a whole, the teachings of Kanevsky et al. are silent on and do not suggest "a modified test suite". Therefore, the teachings of Booth et al. in view of Kanevsky et al. do not teach or suggest ***all*** the claim limitations of Claim 8, as required for establishing a case for *prima facie* obviousness.

As such, the Examiner has failed to establish a case for *prima facie* obviousness of Claim 8 with respect to Booth et al. in view of Kanevsky et al. for at least the reasons discussed hereinabove. Having failed to establish the case for *prima facie* obviousness, the Examiner erred in finally rejecting Claim 8 under 35 U.S.C. 103(a) on the grounds that the rejection is unsupported by the cited references and/or by knowledge generally available to one of ordinary skill in the art.

In finally rejecting Claim 32, the Examiner contended that "Kanevsky et al. teach a Monte Carol [*sic*] simulation (e.g., Col. 4, lines 40-52, Col. 5, lines 18-30)". The Examiner did not further explain the final rejection of Claim 32.

However, contrary to that contended by the Examiner, Appellant's Claim 32 does not recite "a Monte Carol (in actuality, 'Monte Carlo') simulation". Instead, Claim 32 recites "... a processor; a memory; and a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor, implement evaluating the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite to determine the efficacy". Claim 32 is neither concerned with nor recites a Monte Carlo simulation. As such, there would seem to be no basis whatsoever for rejecting Claim 32 under 35 U.S.C. 103(a) with respect to Booth et al. in view of Kanevsky et al.

Appellants gave the Examiner an opportunity to correct any error in the reason for the rejection of Claim 32 in Appellant's Amendment dated and filed 8/29/03. However, the Examiner chose to finally reject Claim 32 for the same, albeit clearly incorrect, reason in the Final Office Action mailed 10/20/03.

Assuming *arguendo* that the Examiner meant to cite a different reason for rejecting Claim 32 under 35 U.S.C. 103(a), Appellant still submits that neither Booth et al. nor Kanevsky et al. disclose or suggest "using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite to determine efficacy", as claimed in Claim 32. As such, the Examiner has failed to provide a motivation to

combine Booth et al. and Kanevsky et al., an expectation of success in such a combination, and that if combined, all elements recited in Claim 32 are disclosed or suggested by the cited references.

As such, the Examiner has failed to establish a case for *prima facie* obviousness of Claim 32 with respect to Booth et al. in view of Kanevsky et al. for at least the reasons discussed hereinabove. Having failed to establish the case for *prima facie* obviousness, the Examiner erred in finally rejecting Claim 32 under 35 U.S.C. 103(a) on the grounds that the rejection is unsupported by the cited references and/or by knowledge generally available to one of ordinary skill in the art. Appellant respectfully submits that the final rejection of Claims 8 and 32 under 35 U.S.C. §103(a) should have been withdrawn.

Issue 3: Whether the Examiner's final rejection of Claim 38 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (USPN 5,922,079) in view of Preist et al. (U.S. Pat. No. 5,808,919) should be reversed on the grounds that the Examiner failed to establish a case for *prima facie* obviousness.

Appellant submits that the Examiner, in finally rejecting Claim 38 under 35 U.S.C. §103(a) as being unpatentable over Booth et al. (US Pat. No. 5,922,079) in view of Preist et al. (US Pat. No. 5,808,919), has erred for failing to establish a case for *prima facie* obviousness, as detailed hereinbelow.

In finally rejecting Claim 38, the Examiner admitted that "Booth et al. fail to teach a list of respective tests, the lists being represented in one or both of human readable form or machine readable form". The Examiner further contended that "Preist et al. teach a list of respective tests, the lists being represented in human readable form (e.g., Col 6, lines 30-41)". The Examiner concluded that it would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the lists of Priest et al. in an automated analysis and troubleshooting system of Booth et al. for the "purpose of providing a diagnostic system for diagnosing the cause of failures of functional tests made on a system under test wherein the system under test comprises a plurality of interacting components and wherein the diagnostic system comprises means for interpreting test results according to a set of operations which are involved in carrying out the tests (Preist et al., Col. 1, lines 61-67)".

Appellant respectfully submits that the Examiner has failed to show: 1) a reasonable motivation to combine or modify; 2) an expectation of success; and 3) that in such combination, all elements claimed in Claim 38 are disclosed or suggested.

Notwithstanding that the requirements for a motivation and an expectation of success are not established by the Examiner with reasonable clarity as being found in the references and not in Appellant's disclosure, Appellant submits that the Examiner has failed to show that all of the elements recited in Appellant's Claim 38 are disclosed or suggested by the combination of Booth et al. and Preist et al.

For example, assuming *arguendo* that Booth et al. where combined with Preist et al., as contended by the Examiner, the combination still would not "teach or suggest ***all*** the claim limitations" of Claim 38. In particular, Claim 38 ultimately depends from and includes all of the limitations of Claim 32. Claim 32 recites in part "a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor, implement evaluating the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite to determine the efficacy". As has been discussed and established hereinabove, Booth et al. do not disclose or suggest at least "a probability of one or both of a correct diagnosis and an incorrect diagnosis" or "using" such a probability to "determine the efficacy". Similarly, Preist et al. fail to disclose or suggest at least these elements recited in Claim 32 that are lacking in the teachings of Booth et al. For at least the same reasons set forth above for Claim 32, the combination of teachings of Booth et al. and Preist et al. fail to disclose or suggest all of the limitations of Claim 38.

As such, the Examiner has failed to establish a case for *prima facie* obviousness of Claim 38 with respect to Booth et al. in view of Preist et al. Having failed to establish the case for *prima facie* obviousness, the Examiner erred in finally rejecting Claim 38 under 35 U.S.C. 103(a) as unpatentable over Booth et al in view of Preist et al. on the grounds that the rejection is unsupported by the cited references and/or by knowledge generally available to one of ordinary skill in the art. Appellant respectfully submits that the final rejection of Claim 38 under 35 U.S.C. §103(a) should have been withdrawn.

Issue 4: Whether the Examiner's final rejection of Claims 31 and 37 should be reversed on the grounds that the Examiner has not provided a specific rejection or reason therefor under any statute or rule.

Appellant submits that the Examiner has erred in finally rejecting Claims 31 and 37 for failing to provide any grounds for the rejection thereof. Without grounds for rejection being specified by the Examiner, Appellant can not comment on the merits, but only respond by pointing this error out to the Examiner. In particular, due to the Examiner's error, Appellant has not been afforded procedural due process under 35 U.S.C. §132 of the patent statute that requires applicant be adequately notified of the reasons for the rejection of claims so that applicant may decide how to proceed. *In re Ludtke*, 441 F.2d 660, 662, 169 USPQ 563, 565 (CCPA 1971).

With respect to Claim 31, Appellant did point out the error to the Examiner in Appellant's Amendment dated and filed 8/29/03 with the USPTO. However, the Examiner chose to finally reject Claim 31 for no stated reason in the Final Office Action mailed 10/20/03 rather than consider Appellant's remarks thereon and correct the error.

With respect to Claim 37, Appellant did not notice the first instance of this error in the Examiner's First Action dated 6/19/03. Unfortunately, the Examiner repeated the error in the Examiner's Final Action dated 10/20/03. Appellant respectfully submits that the Examiner should have provided a statement of reasons for the rejection before finally rejecting Claim 37.

Moreover, Claim 31 is ultimately dependent from base Claim 11 and Claim 37 is ultimately dependent from base Claim 32. At least for the reasons set forth above for the patentability of base Claims 11 and 32 over the final rejections applied thereto under 35 U.S.C. §102(b) and 35 U.S.C. §103(a), Appellant respectfully submits that the final rejection of Claims 31 and 37 should be withdrawn.

Issue 5: Whether the objection raised by the Examiner to Claims 9 and 12-30 as being dependent upon a rejected based claim should be withdrawn in light of the allowability of the respective base claims as established hereinabove.

The Examiner objected to Claims 9 and 12-30 as being dependent from a rejected base claim and noted that the claims would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Appellant appreciates the Examiner's indication of allowable subject matter in Claims 9 and 12-30. However, Appellant submits that the base claims from which Claims 9 and 12-30 are dependent are patentable over the cited references as established hereinabove. Therefore, Claims 9 and 12-30 are believed to be allowable as originally filed. As such, the objection raised by the Examiner should be withdrawn.

In particular, Claim 9 depends from Claim 8 and ultimately depends from Claim 1. Appellant has demonstrated hereinabove that the Examiner failed to establish a *prima facie* case of anticipation with respect to Claim 1. Further Appellant has demonstrated hereinabove that the Examiner failed to establish a *prima facie* case of obviousness with respect to Claim 8. Therefore, the Examiner erred in finally rejecting both Claims 1 and 8. As such Appellant submits that Claim 9 is drawn to allowable subject matter without being rewritten in independent form.

Claims 12-30 ultimately depend from Claim 11. Appellants have demonstrated hereinabove that the Examiner failed to establish a *prima facie* case of anticipation with respect to Claim 11. Therefore, the Examiner erred in finally rejecting Claim 11. As such, Appellant submits that Claims 12-30 are drawn to allowable subject matter without being rewritten in independent form.

In light of the remarks above, Appellant respectfully submits that the objection to Claims 9 and 12-30 should be withdrawn.

RELIEF SOUGHT

Appellant has demonstrated that the Examiner failed to establish *prima facie* anticipation of any of Claims 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b). Further, Appellant has demonstrated that the Examiner failed to establish *prima facie* obviousness of any of Claims 8, 32 and 38 under 35 U.S.C. §103(a). Moreover, Appellant has established that the Examiner erred in finally rejecting Claims 31 and 37 without provided grounds therefor. Also, Appellant has established that objected to Claims 9 and 12-30 are drawn to allowable subject matter without being rewritten in independent form. As such, Appellant has demonstrated that Claims 1-38 are separately patentable, as provided above. Accordingly, Appellant respectfully requests that the Board of Patent Appeals and Interferences reverse each of the

rejection of Claim 1-7, 10-11 and 32-36 under 35 U.S.C. §102(b), the rejections of Claims 8, 32 and 38 under 35 U.S.C. §103(a), and the rejection of Claims 31 and 37 under no grounds, and withdraw the objection to Claims 9 and 12-30.

Respectfully submitted,

Lee A. Barford

By: _____
J. Michael Johnson
Agent for Applicant(s)
Registration No. 37,856

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date indicated below.

_____ 2/12/04
Signature **Date**

Appendix to Appeal Brief

Listing of Claims

Claim 1: A method of determining a revision of a test suite of a model-based diagnostic testing system comprising:

evaluating a diagnostic efficacy of the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite.

Claim 2: The method of Claim 1, wherein the evaluation comprises:

suggesting a test to add to the test suite to adjust an overall test coverage of the test suite.

Claim 3: The method of Claim 2, wherein suggesting a test comprises:

creating a simulation database of the test suite;

determining a probability of a correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database; and

creating a list of suggested tests from the determined probabilities.

Claim 4: The method of Claim 3, wherein each suggested test on the list comprises a test coverage.

Claim 5: The method of Claim 3, wherein the evaluation further comprises:

identifying a test to delete from the test suite that comprises:

determining a probability of a correct diagnosis for a modified test suite using the database, the modified test suite having a selected test removed from the test suite;

computing an efficacy value associated with the selected test using the determined probabilities of a correct diagnosis for the test suite and the modified test suite; and

generating a list of deletable tests and associated efficacy values.

Claim 6: The method of Claim 1, wherein the evaluation comprises:

identifying a test to delete from the test suite, the deletable test having a minimal effect on an overall diagnostic efficacy of the test suite.

Claim 7: The method of Claim 6, wherein identifying a test comprises:

creating a simulation database of the test suite;

determining a probability of a correct diagnosis for the test suite using the database;

determining a probability of a correct diagnosis for a modified test suite using the database, wherein the modified test suite is the test suite having a selected test removed;

computing an efficacy value for the modified test suite using the determined probabilities; and

generating a list of deletable tests using the computed efficacy values.

Claim 8: The method of Claim 7, wherein determining a probability for a modified test suite is repeated for a plurality of modified test suites, each modified test suite of the plurality being the test suite having a different selected test removed.

Claim 9: The method of Claim 8, wherein the selected test associated with the modified test suite having a low computed efficacy value relative to other modified test suites is the deletable test.

Claim 10: The method of Claim 7, wherein evaluating further comprises:

suggesting a test to add to the test suite to adjust an overall test coverage of the test suite that comprises:

determining a probability of an incorrect diagnosis for the test suite using the database; and

creating a list of tests to add from the determined correct and incorrect probabilities for the test suite.

Claim 11: A method of evaluating a diagnostic efficacy of a test suite of a model-based diagnostic testing system comprising:

creating a simulation database of the test suite;

determining a probability of one or both of a correct diagnosis and an incorrect diagnosis for the test suite using the database; and

using the determined probability to evaluate the test suite.

Claim 12: The method of Claim 11, wherein creating a simulation database comprises:

simulating an application of the test suite to a device under test, the device under test comprising one or more components; and

recording a probable result of the application in the simulation database, the simulation database being represented by a table having a plurality of columns and a

plurality of rows, the plurality of columns comprising a component pattern, a test result pattern, and a number of occurrences,

wherein the component pattern encodes which component is good or bad, each component of the device under test being represented by a unique position number within the component pattern,

wherein the test result pattern encodes which of the tests of the test suite failed or passed, each test in the test suite being represented by a unique position within the test result pattern,

wherein the number of occurrences represents a number of times that a given combination of the component pattern and the test result pattern occurred during a simulation, the number of occurrences being an integer greater than or equal to zero, and

wherein each row of the plurality of rows corresponds to a different unique pattern of good and bad components.

Claim 13: The method of Claim 12, wherein determining a probability of one or both of a correct diagnosis and an incorrect diagnosis comprises:

copying to a database copy only those rows of the created simulation database with only one bad component in the component pattern column, all other components in the respective row being good;

sorting the database copy based on the test pattern column, such that the rows with a given test pattern are adjacent to one another, the adjacent rows forming a group of rows;

examining each group of rows to locate a row within each group having a largest number of occurrences relative to other rows within the respective group; and

assigning a diagnosis *d* to each group, the diagnosis *d* being the position number of the bad component for the located row.

Claim 14: The method of Claim 13, wherein determining a probability of one or both of a correct diagnosis and an incorrect diagnosis further comprises creating and initializing a matrix *M* such that matrix elements $M(i, j)$ of the matrix *M* are equal to zero for all *i* and *j*, where *i* is an integer that ranges from one to $m+1$ and where *j* is an integer that ranges from one to *m*, where *m* is the number of tests in the test suite.

Claim 15: The method of Claim 14, wherein for each group having a test pattern that represents no failed tests, determining a probability further comprises:

adding iteratively for each row *r* in the group the number of occurrences value of the row *r* to a current value of the matrix element $M(m+1, b)$ to generate a next value of the matrix element $M(m+1, b)$, where *b* is a position number of the bad component for the row *r*.

Claim 16: The method of Claim 15, wherein for each group having a test pattern that represents at least one failed test, determining a probability further comprises:

adding iteratively for each row *r* in the group the number of occurrences value of the row *r* to a current value of the matrix element $M(d, b)$ to generate a next value of the matrix element $M(d, b)$.

Claim 17: The method of Claim 16, wherein the determined probability of a correct diagnosis P_{corr} is calculated using

$$P_{corr} = \Sigma/E$$

where Σ is a sum of diagonal elements $M(i, i)$ of the matrix M for i equals one to m and E is a sum of all number of occurrence values in the database copy.

Claim 18: The method of Claim 17, wherein using the determined probability to evaluate the test suite comprises:

suggesting a test to add to the test suite to improve diagnostic efficacy.

Claim 19: The method of Claim 18, wherein suggesting a test comprises:

finding a relatively largest value element $M(i,j)$ in the matrix M, where i is not equal to j, the element $M(i,j)$ representing the probability of incorrectly diagnosing component i as the bad component when component j is actually bad; and

suggesting a test t having high coverage for component i and one of either low coverage for component j, if j is not equal to m+1, or coverage being irrelevant, if j is equal to m+1.

Claim 20: The method of Claim 19, wherein suggesting a test further comprises creating a list of suggested tests, wherein creating a list comprises:

repeating finding and suggesting for each element of a set of largest value elements $M(i,j)$, a test being suggested for each element of the set of elements $M(i,j)$; and

computing a score for each of the suggested tests, the score being computed by dividing the element value $M(i,j)$ by the total accumulated number of occurrences E.

Claim 21: The method of Claim 20, wherein the list of suggested tests is represented in one or both of human readable form or machine-readable form.

Claim 22: The method of Claim 17, wherein using the determined probability to evaluate the test suite comprises:

identifying a test t of the test suite that may be deleted from the test suite.

Claim 23: The method of Claim 22, wherein for identifying a test t to delete from the test suite, the method further comprises:

determining a probability of a correct diagnosis $P_{corr,t}$ for a modified test suite using the database, the modified test suite having a selected test t removed from the test suite;

computing an efficacy value for the modified test suite using the determined probabilities for the test suite and for the modified test suite; and

generating a list of deletable tests, the deletable tests having a lowest associated efficacy relative to efficacies of other tests in the test suite.

Claim 24: The method of Claim 23, wherein determining a probability of a correct diagnosis $P_{corr,t}$ for a modified test suite associated with each of the tests t in the test suite comprises using a modified database created from the database copy, wherein the modified database is created comprising:

copying the database copy into another database copy;

selecting a test t to remove from the test suite;

deleting a position from each test pattern associated with the selected test t from the other database copy; and

copying rows of the other database copy into a modified database, such that any rows that have identical values for the component pattern and the test pattern are combined together in the modified database,

wherein in each row of the modified database that represents a set of combined rows from the other database copy the number of occurrences is a sum of the number of occurrence values for the combined rows.

Claim 25: The method of Claim 24, wherein the probability of a correct diagnosis $P_{corr,t}$ for each of the modified test suites is determined in a manner analogous to determining the probability of a correct diagnosis P_{corr} for the test suite.

Claim 26: The method of Claim 24, wherein determining a probability of a correct diagnosis $P_{corr,t}$ for the modified test suite T' using the modified database comprises:

summing a largest number of occurrences value v_{max} found for each unique test pattern value within the modified database; and

dividing the v_{max} sum by a total number of occurrences E_t, where the total number of occurrences E_t is the sum of all numbers of occurrences in the modified database.

Claim 27: The method of Claim 23, wherein computing an efficacy value for each of the tests in the test suite comprises computing a difference between the determined probability of a correct diagnosis $P_{corr,t}$ for the modified test suite corresponding to a selected test t and the determined probability of a correct diagnosis P_{corr} for the test suite.

Claim 28: The method of Claim 27, wherein the computed efficacy $\varepsilon(t)$ value further comprises a cost metric $c(t)$ associated with the test t, where $\varepsilon(t) = c(t)\cdot(P_{corr,t} - P_{corr})$.

Claim 29: The method of Claim 27, wherein the generated list of deletable tests comprises an associated efficacy value for each of the deletable tests.

Claim 30: The method of Claim 23, wherein the generated list is represented in one or both of human readable form and in machine-readable form.

Claim 31: The method of Claim 11, wherein the created simulation database comprises a Monte Carol simulation of the device under test model, the database having a set of entries, each entry having a field for a number-of-occurrences value, a field for a test result pattern, and a field for a component state pattern.

Claim 32: A system that determines efficacy of a test suite of a model-based diagnostic testing system comprising:

a processor;

a memory; and

a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor, implement evaluating the test suite using a probability of one or both of a correct diagnosis and an incorrect diagnosis by the test suite to determine the efficacy.

Claim 33: The system of Claim 32, wherein the instructions that evaluate the test suite comprise one or both of suggesting a test to add to the test suite, and identifying a test to delete from the test suite.

Claim 34: The system of Claim 32, wherein the instructions that evaluate the test suite comprise:

creating a simulation database of the test suite;

determining a probability of one or both of a correct diagnosis and an incorrect diagnosis using the database; and

using the determined probability to evaluate the test suite.

Claim 35: The system of Claim 34, wherein using the determined probability of both a correct diagnosis and an incorrect diagnosis comprises creating a list of suggested tests to add to the test suite, each suggested test having an associated test coverage.

Claim 36: The system of Claim 34, wherein the instructions that evaluate the test suite further comprise:

determining a probability of a correct diagnosis for a modified test suite using the database, the modified test suite having a selected test removed from the test suite;

and wherein using the determined probability comprises:

computing an efficacy value for the modified test suite using the determined probability of a correct diagnosis for both the test suite and the modified test suite; and

generating a list of tests to delete from the test suite based on the computed efficacy value.

Claim 37: The system of Claim 36, wherein determining a probability of a correct diagnosis for a modified test suite is repeated for different modified test suites, each different modified test suite having an associated different selected test being removed.

Claim 38: The system of Claim 33, wherein suggesting a test to add to the test suite and identifying a test to delete from the test suite each comprise a list of respective tests, the lists being represented in one or both of human readable form or machine-readable form.

* * *